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REPORT TO
THE CONGRESS OF THE UNITED STATES

EXAMINATION OF
CONSTRUCTION AND RELATED COSTS
RAYBURN HOUSE OFFICE BUILDING

HOUSE OFFICE BUILDING COMMISSION
ARCHITECT OF THE CAPITOL



BY
THE COMPTROLLER GENERAL
OF THE UNITED STATES

APRIL 1967



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COMPTROLLER GENERAL OF THE UNITED STATES

WASHINGTON, D.C. 20548

B-145899

April 7, 1967

To the President of the Senate and the
Speaker of the House of Representatives

The accompanying report presents the results of our examination of the costs incurred to June 30, 1965, in the construction of the Rayburn House Office Building and directly related facilities. This examination was made pursuant to the statutory authority and responsibility of the Comptroller General, as made applicable to the Architect of the Capitol by the Legislative Branch Appropriation Act, 1965.

Construction of the subject structure and acquisition of the related property were among several undertakings authorized by the Additional House Office Building Act of 1955 (69 Stat. 41), approved April 22, 1955. The act appropriated \$5 million for the undertakings specified in the act and authorized to be appropriated such additional amounts as may be determined by the House Office Building Commission to be required. The act further authorized the Architect of the Capitol under the direction of the House Office Building Commission to enter into contracts and to make such other expenditures as may be necessary to carry out the designated undertakings and to obligate the additional amounts authorized before the appropriation thereof.

Funds appropriated by the Congress through fiscal year 1966, applicable to the Rayburn Building and related facilities, amounted to \$99,205,685. The Architect estimated that the cost to June 30, 1966 (believed to be the estimated cost to completion), would be \$98,209,685, including \$8,955,685 for the subway between the Capitol and the Rayburn Building and for the pedestrian tunnels between the Longworth and Rayburn Buildings. Actual costs incurred to June 30, 1965, totaled \$94,749,415, exclusive of certain contract changes and claims. (See p. 8.)

All construction, exclusive of contract changes, and substantially all procurement of furniture and furnishings were contracted by publicly advertised competitive bidding and represented the bulk of the costs of the Rayburn Building project. Our examination did not disclose any questionable aspects of the solicitation of bids or the award of contracts. The significant findings of our examination relate to certain elements of contract changes, architect-engineering fees, and conformance with

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plans and specifications, which we believe warrant comment or are otherwise appropriate for reporting to the Congress for its information. These findings, together with the comments thereon by the Architect of the Capitol and our analysis of those comments, are summarized on pages 17 through 24 of the accompanying report and are discussed in detail in the pertinent sections of the report.

In his comments, the Architect claimed justification for most of the actions to which the findings were directed, generally on the ground that these actions were in line with special circumstances which obtain in a construction project for the Congress--those circumstances obtaining in greater degree to the Rayburn Building--and with practices traditionally followed by the Architect's office in similar types of projects. We believe that the findings brought out in this report will be of value to the Congress in its consideration of future construction.

Copies of this report are being sent to the members of the House Office Building Commission and to the Architect of the Capitol.

A handwritten signature in cursive script, reading "James B. Stewart".

Comptroller General
of the United States

REPORT ON
EXAMINATION OF
CONSTRUCTION AND RELATED COSTS
RAYBURN HOUSE OFFICE BUILDING
HOUSE OFFICE BUILDING COMMISSION
ARCHITECT OF THE CAPITOL

INTRODUCTION

The General Accounting Office has made an examination into the costs incurred in the construction of the Rayburn House Office Building and directly related facilities. This examination was made pursuant to the authority and responsibility vested in the Comptroller General under the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67) as made applicable to the Architect of the Capitol by the Legislative Branch Appropriation Act, 1965 (78 Stat. 535), approved August 20, 1964.

Our examination was made at the office of the Architect of the Capitol (Architect) who was responsible for implementation of the construction under the direction of the House Office Building Commission (Commission). The scope of our examination is further described on page 107.

The Architect of the Capitol is responsible to the Congress or to certain bodies of the Congress for (1) the structural and mechanical care, maintenance, and operation of the Capitol Building, the Senate and House of Representatives Office Buildings, the Supreme Court and Library of Congress Buildings, and related facilities, (2) the care and improvement of the Capitol grounds, (3) the operation of the Senate and House of Representatives restaurants, and (4) the planning and construction of such buildings as the

Congress may assign to him from time to time. These responsibilities derive principally from the act of August 15, 1876 (40 U.S.C. 162), and subsequent amendments.

The first Architect was appointed by the President on an "as needed" basis; however, the office of the Architect has been in existence continuously since 1851. Originally the duties of the Architect were to plan and construct the Capitol Building and thereafter to supervise its care and maintenance. The incumbent Architect is Mr. J. George Stewart who was appointed by the President in August 1954 and took office in October 1954.

The House Office Building Commission, as presently composed, was created by the act of March 4, 1907 (40 U.S.C. 175), which provided that the care, maintenance, and operation of the Cannon House Office Building was to be under the control and supervision of the Architect of the Capitol, subject to the approval and direction of a commission consisting of the Speaker and two members to be appointed by the Speaker. Vacancies were to be filled by the Speaker, and any two members were to constitute a quorum to do business. In 1919 the Commission decided that the Speaker was to be Chairman of the Commission and the other two members were to consist of one majority member and one minority member of the Congress.

The Additional House Office Building Act of 1955 (69 Stat. 41), approved April 22, 1955, provided that the Architect be responsible for the acquisition of property for, and construction of, the Rayburn Building, subject to the approval and direction of the Commission.

The members of the Commission during the period April 1955 to the present are listed below.

	<u>From</u>	<u>To</u>
John W. McCormack, Chairman	Jan. 1962	Present
Sam Rayburn, Chairman	Jan. 1955	Nov. 1961
James C. Auchincloss	Jan. 1947	Jan. 1965
Carl Vinson	Jan. 1955	Jan. 1965
Charles E. Goodell	Jan. 1965	Present
Emanuel Celler	Jan. 1965	Present

LEGISLATIVE BACKGROUND

The Additional House Office Building Act of 1955 (69 Stat. 41) approved April 22, 1955, authorized the acquisition of such property and the construction of an additional fireproof office building for use of the House of Representatives, together with such necessary equipment, utilities, access facilities over and under public streets, changes in present House Office Buildings and other changes necessitated thereby, and changes in or additions to the present subway systems, as may be approved by the House Office Building Commission.

The specific undertakings initiated pursuant to this authorization were (1) acquisition of property and construction of an additional house office building thereon, including a subway between the Capitol and the additional house office building and pedestrian tunnels connecting the additional house office building and the Longworth Building, (2) acquisition of other properties, (3) construction of underground garages, and (4) remodeling of the Cannon and Longworth Buildings.

The Supplemental Appropriation Act, 1963 (77 Stat. 20), provided that appropriations authorized by the 1955 act would be available also for necessary furniture and furnishings for the above undertakings. By joint resolution (76 Stat. 71) approved May 21, 1962, the additional house office building was designated as the Rayburn House Office Building (hereinafter referred to as the Rayburn Building).

The 1955 act appropriated \$5 million for the work specified in the act and authorized to be appropriated such additional sums as may be determined by the House Office Building Commission to be required for the purposes of the work. The act further authorized

the Architect under the direction of the Commission to enter into contracts and make such other expenditures, including those for personal and other services, as may be necessary to carry out the work and to obligate the additional amounts authorized prior to the actual appropriation thereof.

Contract authorizations made by the Commission to July 30, 1965, and funds appropriated by the Congress through fiscal year 1966, applicable to the Rayburn Building, aggregated \$99,205,685, of which \$98,209,685 represented the estimated cost (see p. 8) and \$996,000 was being held pending adjudication of disputed claims (see p. 27).

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ESTIMATE OF COST

At the time construction of the building was authorized in 1955, architectural plans had not been developed and no estimate of the construction cost had been made.

The initial estimate of the cost of constructing the foundation, structural steel, and superstructure and equipment, as reported in May 1956 by the architect consultants (see p. 36), was \$64 million. The final report of the architect consultants in May 1957 estimated the cost at \$66.5 million and stated that approximately \$2 million of the increase was due to changes, principally turning the ends of the wings of the building toward the open courts on the east and west facades, authorized during the development of the preliminary plans.

Thereafter further changes were made including the addition of another standing committee room and related staff offices, another subcommittee room, and a gymnasium and the deletion of a moving walkway system. On the basis of the final plans and specifications prepared for contract bid and award, the architect consultants estimated a cost of \$72,373,372. The contract awards totaled \$64,366,500.

The cost of the subway was estimated in July 1958 by the architect consultants (see p. 39) at \$1,788,000, exclusive of the passenger cars. This estimate was increased to \$4,121,031 in May 1960 and finally to \$6,027,415 (including \$300,000 for the passenger cars in each estimate), on the basis of plans and specifications prepared for contract bid and award. The increased estimates were attributed by the architect consultants primarily to changes in the scope of work. The contract awards for the subway system aggregated \$6,016,139.

The final estimates of the architect consultants and related contract awards for the construction segments of the building are summarized below.

<u>Construction segments</u>	<u>Final estimates</u>	<u>Contract awards</u>
Relocation of Tiber Creek sewer	\$ <u>1,750,000</u>	\$ <u>1,327,000</u>
Foundation	9,237,200	6,666,000
Structural steel	7,360,000	6,907,500
Superstructure and equipment	<u>55,776,172</u>	<u>50,793,000</u>
	<u>72,373,372</u>	<u>64,366,500</u>
Subway:		
Alterations in the Capitol	2,500,000	2,695,000
Subway and terminals	2,312,565	2,060,126
Hoistways and related work	564,850	759,500
Elevators and moving stairways	350,000	273,513
Passenger cars	<u>300,000</u>	<u>228,000</u>
	<u>6,027,415</u>	<u>6,016,139</u>
Pedestrian tunnels	<u>932,413</u>	<u>880,400</u>
Total	<u>\$81,083,200</u>	<u>\$72,590,039</u>

In hearings on the legislative branch appropriation for 1966 before the Subcommittee on Legislative Appropriations, House Committee on Appropriations, the Architect submitted estimated obligations for all undertakings initiated pursuant to the 1955 act from inception to June 30, 1966. These estimates included \$98,209,685 which was considered by us to be applicable to the Rayburn Building and directly related work, as follows:

Acquisition of site	\$ 2,500,000
Preparation of site (\$1,392,805 for relocation of Tiber Creek sewer)	1,690,220
Foundation	8,830,000
Structural steel	7,208,700
Superstructure and equipment	55,500,000
Furniture and furnishings	3,500,000
Other items	460,605
Architectural and engineering services (note a)	4,000,000
Subway between Capitol and Rayburn Building	7,909,700
Pedestrian tunnels between Longworth and Rayburn Buildings	1,045,985
Administration costs	3,564,475
Reserve for completion of undeveloped space	<u>2,000,000</u>
Total	<u>\$98,209,685</u>

^aRelates to relocation of Tiber Creek sewer, to foundation, to structural steel, and to superstructure and equipment. Similar fees in respect of furniture and furnishings, subway, and pedestrian tunnels are included in the amounts shown for these items.

Costs incurred to June 30, 1965, in respect of the Rayburn Building aggregated \$94,749,415 exclusive of (1) contract changes for which costs had not been finalized, (2) claims for \$996,000 (see p. 27), and (3) other claims totaling \$196,804 (see app. I). The major items constituting the difference of about \$3.5 million between the estimated costs and the costs incurred were the reserve of \$2 million and estimated additional costs of \$735,000 for the superstructure and equipment, \$471,000 for furniture and furnishings, and \$241,000 for administration costs.

A schedule of the basic contract costs, contract change costs, and total costs incurred to June 30, 1965, and the Architect's estimates as shown above (believed to be estimates of cost to completion) are presented in appendix I.

DELAYS IN CONSTRUCTION

Completion of the Rayburn Building extended considerably beyond its originally planned completion date. In its final report on preliminary plans and specifications, dated May 15, 1957, the architect consultants stated that occupancy of the building could be expected to commence early in 1961. However, the estimates of time for accomplishing the several segments of construction were lengthened when the detailed plans and specifications were prepared, and consequently the estimated completion date was extended.

Construction was scheduled by segments in the time sequence in which each segment would be done so that the initiation and completion of work on each segment was dependent upon the completion of the preceding segment. Thus, the on-site foundation work was not started until the sewer relocation was completed and the superstructure was not started until substantial areas of the foundation work were completed. The structural steel work was performed, for the most part, concurrently with the foundation work. Separate contracts were let for each segment of construction.

Construction of the building could have been completed by January 1962 if the number of days allowed in the original contracts had been met. However, substantial overruns in contract time occurred on several segments of the construction.

The sewer relocation exceeded its contract time by 446 days, of which 265 days were attributable to contract additions and modifications and 37 days to unusually severe weather conditions. The Architect determined that the contractor was responsible for the remaining 144 days and therefore assessed liquidated damages of \$28,800 against the contractor. The foundation work overran its contract time by 511 days; this overrun was attributed by the

Architect to contract additions and modifications (415 days) and to adverse weather conditions (96 days).

The structural steel work exceeded its contract time by 579 days, of which 118 days were due to a steel strike and the balance was due principally to delays in completion of the foundation work. The superstructure which was scheduled to be completed by August 9, 1964, was accepted as having been completed on January 15, 1965; the scheduled completion date was extended by 159 days to that date and was attributed to the numerous contract changes.

The original completion dates for the individual segments of construction under the related contracts and the actual completion dates are shown below.

<u>Contract</u>	<u>Original completion date</u>	<u>Actual completion date</u>
Sewer relocation	9-25-57	12-15-58
Foundation	4- 8-60	9- 1-61
Structural steel	5-27-60	12-27-61
Superstructure	8- 9-64	1-15-65

PHYSICAL CHARACTERISTICS OF BUILDING

In considering the general design of the Rayburn Building, the Commission decided that it should be of classic design in keeping with the Capitol and other structures on Capitol Hill, the ceilings should be of liberal height on the four main floors, the rooms should be large and as free from extraneous noises as possible, and the quality of construction of the Cannon Building should be maintained. These general criteria were given to the architect consultants as guidelines in developing the design of the building.

In accordance with the design finally accepted by the Commission, the building is an "H" type of structure with four wings extending out from an enclosed central court. Its principal front faces on Independence Avenue, SW., the east front on South Capitol Street, the west front on First Street, SW., and the rear on C Street, SW. The general dimensions of the building are 737 feet east and west by 453.75 feet north and south. The exterior of the building is of white marble above the first floor and of granite below. The exterior sides facing the center court are limestone. The building is connected with the Longworth Building by two pedestrian tunnels and with the Capitol by a subway. (See pp. 15 and 16 for architect's drawing and site plan.)

The building consists of three garage levels, a subbasement, a basement; four main floors, and a penthouse floor principally for location of electrical and mechanical equipment. The building provides for 169 three-room suites; 9 standing committee rooms; 16 subcommittee rooms; 18 committee anterooms; 51 committee and subcommittee staff rooms; facilities for the building maintenance force; and various other accommodations including post office, radio and television facilities, telephone and telegraph rooms,

Library of Congress book station, first-aid rooms, shipping and receiving facilities, garage space, a cafeteria, a barber shop, two gymnasiums (one for men and one for women), and a swimming pool. Some unassigned areas are to be assigned when needed.

The building is served by 23 escalators and 30 automatic elevators which can be operated manually. Main corridors are 12 feet 6 inches in height and 12 feet wide except in the wings where corridor widths are about 9 feet.

The building has a total content of about 35 million cubic feet and a total area of approximately 2,375,000 square feet, of which about 2,000,000 square feet is considered as usable space. A breakdown of space area by major categories, based on information furnished by Architect personnel, is shown below.

<u>Category</u>	<u>Gross area</u>	<u>Usable space</u>
	(square feet)	
Congressional suites	322,802	256,192
Committee and subcommittee suites and related anterooms, staff rooms, and other facilities	118,818	94,300
Garages including ramps, car-washing facilities, guardrooms, and waiting rooms	1,185,385	1,059,035
Stairs, lobbys, corridors, elevators, escalators, subway terminal, toilets, locker rooms, equipment rooms, and maintenance shops	469,883	374,245
Gymnasiums:		
Men	14,476	11,489
Women	4,135	3,282
Swimming pool	12,615	11,437
Cafeteria	25,145	19,956
Communication facilities (press, radio, television, telephone, telegraph), first aid, mailroom, miscellaneous staff offices	91,927	72,958
Storage, including space for congressional and committee requirements	74,053	58,772
Unassigned areas	<u>55,283</u>	<u>43,875</u>
Total area	<u><u>2,374,522</u></u>	<u><u>2,005,541</u></u>

Each Congressman's suite consists of three rooms with two entrances from the corridor--one to the reception office and the other to the Congressman's private office. Each suite occupies a minimum space 52 feet 6 inches long by 29 feet wide although there are variations depending upon the locations of the suites, and it includes built-in closets, files storage, a refrigerator, a safe, and two toilets--one for the Congressman and one for the staff. The suites are located on all four main floors--23 on the first floor, 41 on the second floor, 46 on the third floor, and 59 on the fourth floor. The ceiling height in each Congressman's office is approximately 13 feet 9 inches.

Of the standing committee rooms, eight are on the first floor and one is on the third floor. The eight rooms on the first floor are two stories in height (29 feet 6 inches) and the room on the third floor is one story in height (13 feet 5 inches); each room occupies an overall area approximately 56 feet by 46 feet. Each room has a raised rostrum of two rows to accommodate 41 members and provides seating for about 140 spectators.

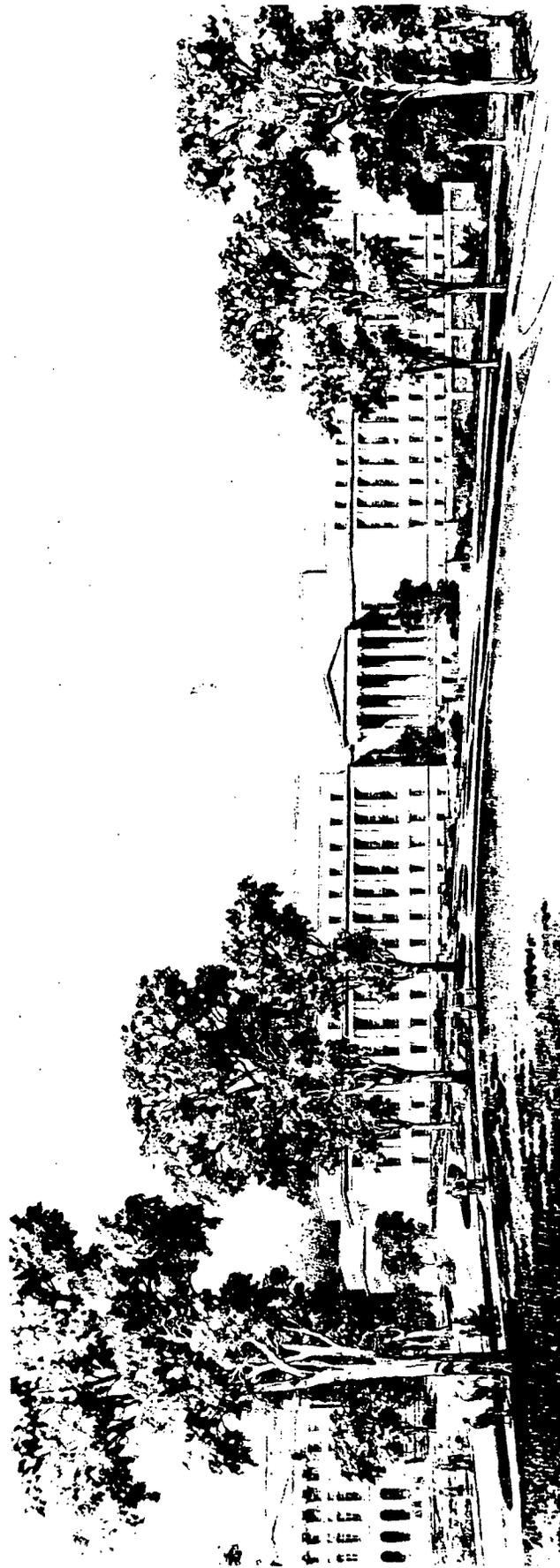
Subcommittee rooms vary in size, the minimum being approximately 35 feet by 29 feet and the maximum being 48 feet by 46 feet; the ceiling height is approximately 13 feet 9 inches. There are 15 subcommittee rooms on the second floor and one on the third floor.

About 1,600 parking spaces are provided in the three garage levels and subbasement and basement floors; about 1,420 spaces are provided in the garage levels. Parking spaces are generally 10 feet wide by 20 feet long for 90-degree parking. In addition, there are a few parallel parking spaces along the walls which are 10 feet wide by 24 feet long.

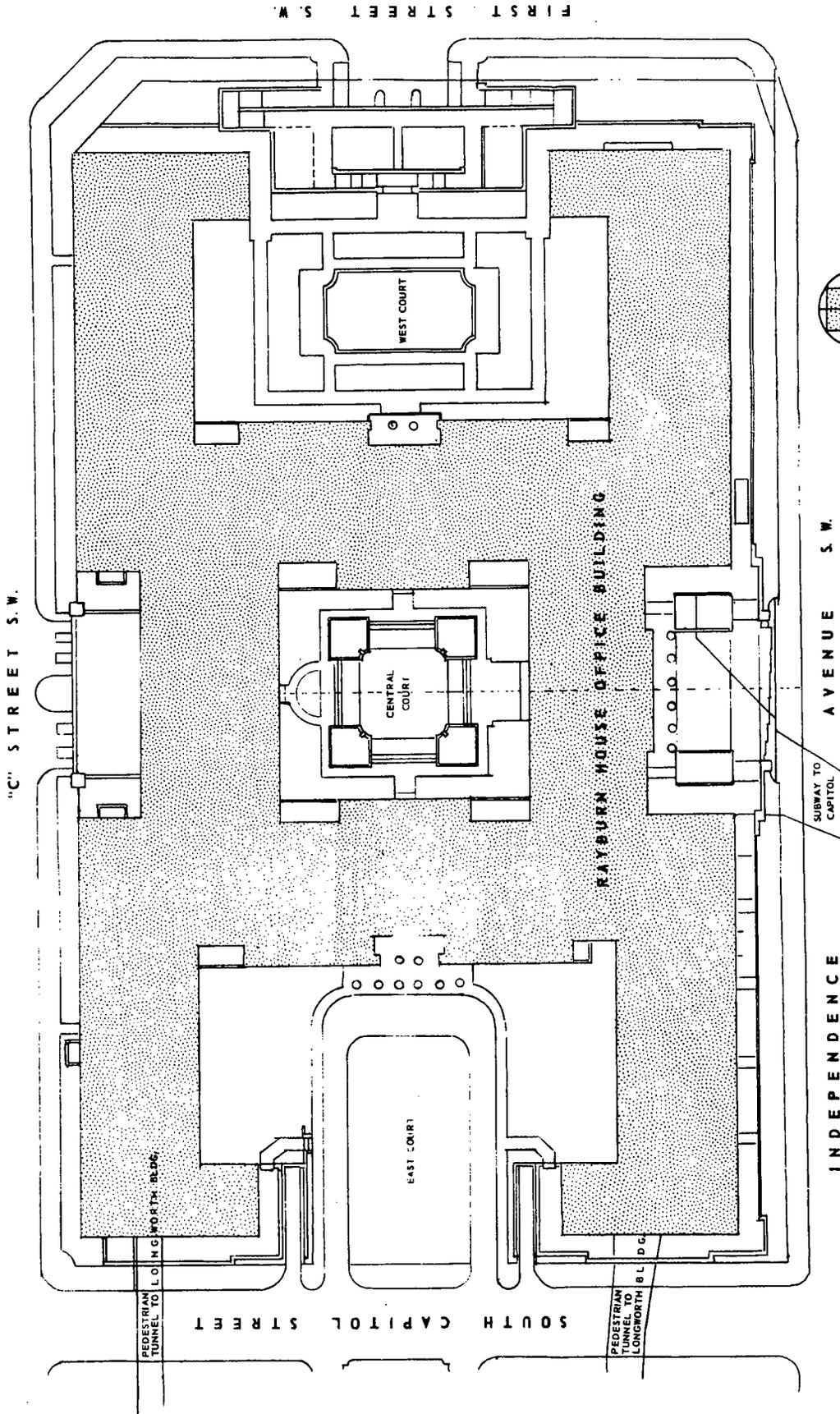
The cafeteria facility has a seating capacity of about 750 persons and, in addition to the main cafeteria, includes a private buffet room and a private service dining room. The swimming pool is 20 feet by 60 feet with depths ranging from 3 feet to 10 feet. The men's gymnasium includes:

1. A main room about 110 by 48 feet which has five handball courts.
2. An exercise room.
3. A hydrotherapy room.
4. A masseur's room.
5. Rest and quiet areas.
6. Locker and shower facilities.
7. A storage area.

Equipment for the gymnasium includes a rowing machine, exercrow (exercise) machine, double bicycle trainer, chinning bar, pulley weight, mats, Indian club set, striking bag, training bag, dumbbell set, medicine balls, and sun lamps. The women's gymnasium consists mainly of several individual rooms and is more in the nature of an exercise facility than a conventional gymnasium.



Architect's Drawing
Rayburn House Office Building
Independence Avenue View



SITE PLAN

SUMMARY OF FINDINGS

The significant results of our examination relate to contract changes, architect-engineering fees, and conformance with plans and specifications. Certain matters in each of these areas, which we believe warrant comment, are reported herein. The comments of the Architect of the Capitol on the draft of this report and our analysis of these comments together with the comments of the architect consultants, the landscape architects, and the superstructure contractor are presented in appendixes III to VII and are summarized at the end of the pertinent sections of the text of this report.

All construction, except for contract changes, and substantially all procurement of furniture and furnishings, which account for the bulk of the costs of constructing and equipping the Rayburn Building, were accomplished under publicly advertised competitive bid contracts, and our examination did not encounter any aspects of the solicitation of bids or the award of contracts that offered any basis for question.

CONTRACT CHANGES (p. 42)

Contract changes to June 30, 1965, totaled approximately \$8 million, representing those changes of a total of about 1,450 changes which had been formalized into change orders; according to the Architect's records, proposals by contractors for changes not formalized at that date totaled about \$668,000.

Although changes probably cannot be entirely avoided, their disadvantages from the standpoint of economical cost argue strongly for holding them to a minimum level. These disadvantages result from the fact that:

1. Contract changes are generally negotiated with the prime contractor on the basis of its estimated cost and profit, and the Government thereby loses the benefit of competitive bidding because, as a practical matter, it usually is not feasible to have another contractor do the contract change work and, even in those cases where it might be feasible, the contractor on the job would have a decided advantage over any other prospective bidder.
2. Changes frequently disrupt the normal sequence of construction operations and require the removal or modification of work partially or completely done and therefore result in consequent extensions of contract time.
3. Changes require considerable time and effort in developing details, negotiating prices, and preparing and processing the paper work and thus add to the administrative burden.

These factors tend to increase the cost of a project, and, although the increase is not generally measurable, it is undoubtedly significant in a large project on which many changes aggregating a substantial amount have been made.

On the basis of our selective review of contract changes in respect of the Rayburn Building, certain changes by their nature, size, or the circumstances of their occurrence seem appropriate for reporting to the Congress. Because these changes implicitly carried the disadvantages noted above, they probably added significantly to the cost of the Rayburn Building project. Except for some minor items of work in certain changes, it was not practicable to ascertain the amount of these additional costs that could have been avoided if the work covered by contract changes had been included in the basic contracts.

Some changes approved by the Commission represented items which the Commission had considered during the design and planning

stages but had excluded from the basic construction contracts as awarded, and other changes were approved to meet certain situations which developed subsequent to award of the basic contracts. Certain of these changes which are discussed hereinafter aggregated in excess of \$2 million and included the cafeteria, gymnasium annex, women's health facilities, clocks in members' offices, operation and maintenance of building equipment, and procurement of additional furnishings.

Certain other changes totaling about \$2.2 million resulted from the decision of the Architect to proceed with some segments of construction, principally the foundation, before the plans for other segments were finalized, a procedure not generally followed in construction. The Architect's office estimated that departure from the conventional design sequence advanced the completion of the Rayburn Building by about 2 years and avoided rising costs at a rate of about 4 percent a year.

We are unable to affirm or dispute these claimed benefits in view of the extensive delays in the more than 8 years from the time construction was started and of the uncertain effect of cost escalation on bids for large construction due to the influence of competitive forces, technological advances, and the level of construction activity generally and of individual contractors.

Some of the changes directed by the Architect had been considered or were of a nature which in our opinion should have been considered in the development and review of the plans and specifications. According to the record some of the work related to these changes was omitted for reasons of economy; as to other changes it appears that the work was overlooked in the development and review

of plans and specifications although the work did not seem to be of an unusual nature.

Most significant of the changes directed by the Architect was one (\$665,000) for the primary purpose of reducing by about 80 feet the walking distance from the Capitol end of the subway to the elevators in the Capitol. This item had been rejected for reasons of cost at the time the original plans and specifications for the subway were being prepared, and the record did not show why it was reinstated as a change after the basic contract had been awarded.

We also found many changes for which (1) the contractors' proposals were not sufficiently specific to permit a judgment as to the reasonableness of the proposals and (2) the documentation supporting the review by the Architect was not sufficiently informative to determine the effectiveness of the Architect's reviews of contractor proposals and the reasonableness of the prices agreed upon. These conditions related principally to the verification of unit prices and material quantities, labor rates and hours, equipment rental rates and hours of usage, and details of price adjustments resulting from negotiations.

On the basis of our findings, we believe that:

1. The added costs which are implicit in contract changes may be substantially reduced in future construction if the significant features that should be included in a construction project can be decided upon before finalization of the plans and specifications in such conclusive manner as will minimize extensive changes.
2. An effective system is needed by the Architect to ensure adequate documentation for the various elements of contract changes.

3. The Architect should consider the practices generally followed in Government and private construction that, in the absence of compelling circumstances, plans and specifications for all segments of construction should be finalized and integrated before any construction is started and that bids for construction should be solicited and awarded on the basis of single contractor direction and responsibility.

With regard to the above conclusions, the Architect stated that:

1. His office did not disagree with the principle of including all significant features in the original plans but that these matters were not always determined by his office.
2. Documentation was considered adequate for the use of the Architect's skilled estimators but it might not have been adequate for complete analysis by auditors not trained in the construction field.
3. If time were not a factor, there would be no disagreement with the practices generally followed in Government and private construction but that, in the instant case, time was an important consideration since the Architect was ordered by higher authority to proceed with certain segments of the project as expeditiously as possible.

Concerning item 2 above, we cannot agree that the documentation, which the Architect claims was adequate for the skilled estimators of his office, constituted acceptable evidence that the contractors' proposals were sufficiently checked and that the basic items of negotiation were so identified as to enable a judgment that the final prices agreed upon were reasonable.

ARCHITECT-ENGINEERING FEES (p. 75)

Contracts for architect and engineering services were negotiated with selected firms and, except for one contract, the fees were payable at stipulated percentages of the actual costs of the segments covered by the contracts.

It appears from our review that the fee payable for architectural services relating to certain segments of the construction was significantly more than the General Services Administration (GSA) probably would have authorized under its criteria at the time (1955) that the contract for these services was negotiated by the Architect. The Architect justified the fee on the ground that it was in line with the recommended rates of the Washington-Metropolitan Chapter of the American Institute of Architects.

The lump-sum contract for landscape architectural services, which covered various areas including the area on which the Rayburn Building is located, does not appear to have been the appropriate type of contract in the circumstances existing at the time, and it may have been more costly than was necessary. In addition, there was no substantive documentation on the negotiation of the contract. Although negotiations with the contractor resulted in agreement to reduce the contract fee, the reduced amount is considerably more than the fee would have been had it been based on representative rates furnished by the American Society of Landscape Architects.

The Architect and architect consultants in their comments offered various reasons in justification of the aforesaid fees. These reasons and our analysis thereof are discussed in the pertinent sections of the detailed text of this report.

CONFORMANCE WITH PLANS AND SPECIFICATIONS (p. 89)

The pertinent records of the Architect indicate that certain construction work did not meet the standards specified in the superstructure contract. This work involved the compressive strength of a reinforced concrete wall, thicknesses of concrete slabs in the garage levels, uniform coloring of concrete in the garage levels, compaction of backfill, and condition of gypsum block walls in the subbasement. Reporting of these instances is not intended to imply that they were representative of the overall quality of the construction work. However, these instances related to ordinary and regular construction work for which clear and precise standards have been established on the basis of considered engineering judgment.

According to the Architect's office these instances were not structurally significant, and because of their technical nature we are not in a position to evaluate this judgment. We believe that the extensive effort required to dispose of these cases and the manner in which the Architect dealt with them are appropriate for reporting by our Office to the Congress.

In our analysis of the data underlying these instances, we noted some apparent inconsistencies which we could not reconcile either from available documentation or by inquiry of the responsible officials. We also took note of the fact that extended periods of time taken in efforts to resolve differences of opinion between contractors and owners regarding incidents of nonconformance and the continuance of construction in the meantime often create a situation, apparent in some of the subject instances, wherein

practical considerations dictate the acceptance of nonconforming work either as it is or with some improvised substitute, sometimes with a credit against the contract price.

As means which may be conducive to minimizing incidents of nonconformance with specifications and to properly correcting such incidents when they occur, it is our view that the Architect should give particular attention to accelerating the negotiation of reported incidents of nonconformance with the contractor and, where warranted by the significance of any incidents, should take such positive action, particularly the assertion of contractual rights, as will help to resolve the incidents quickly and satisfactorily.

The Architect stated that the provisions of the plans and specifications were complied with, except as to a few minor items, and that, in any large project of the nature of the Rayburn Building, there were bound to be disputes involving compliance with the advertised plans and specifications. The Architect did not comment on the principal points of our discussion on this subject which had to do with the extensive effort required to resolve such disputes and, by reason thereof, the necessity in some cases for accepting some compromise; neither did he comment on our suggestion for minimizing the effects of prolonged controversy on incidents of nonconformance.

The superstructure contractor did not comment on the specific matters discussed in this section of the report because it considered that our discussion was directed to management actions of the Architect. It expressed agreement with our conclusion that alleged incidents of nonconformance with specifications should be reviewed with the contractor as quickly as possible by a responsible official of the Architect's office.

SYNOPSIS OF MAJOR COST ELEMENTS AND
RELATED CONTRACTS AND CONTRACT CHANGES

The major cost elements constituting the estimate of \$98,209,685 for the construction of the Rayburn Building, as listed on page 8, and the individual contracts relative to these elements are described briefly below, together with references to major changes and to actual costs incurred to June 30, 1965. All construction and substantially all furniture and furnishings were contracted at fixed prices to the lowest qualified bidders on the basis of publicly advertised competitive bidding.

About 480 change orders had been issued to June 30, 1965, aggregating approximately \$8 million. A change order consists of one or more individual changes, each of which is designated as a supplement. Generally supplements are issued as the basis for beginning work on a change and are incorporated, later, in a change order. At June 30, 1965, about 1,450 supplements, of which 59 involved amounts of \$25,000 or more, had been issued but all of them had not yet been covered by change orders.

The amount of each supplement was negotiated on the basis of proposals submitted by the prime contractor. These proposals generally represented the prime contractor's and each subcontractor's estimated direct costs; overhead computed at 10 percent of direct costs, exclusive of social security and unemployment compensation taxes; profit computed at 10 percent of adjusted direct and overhead costs; and, for each subcontractor's total estimate, an additional 21 percent on the first \$1,000 and 10 percent thereafter for the prime contractor. However, in several significant instances, principally in the foundation contract, the contractors' overhead and profit were negotiated at percentages less than 10 percent.

Except in certain instances independent estimates were not made by the Architect or the architect consultants. Individual change orders or supplements thereof in the amount of \$25,000 or more, aggregating \$6.7 million, are listed in appendix II.

ACQUISITION OF SITE--\$2,500,000

The Rayburn Building is constructed on what is known as squares 635 and 636 which encompass the area surrounded by Independence Avenue, SW.; First Street, SW.; C Street, SW.; and South Capitol Street. Square 636 (about 2.1 acres) was acquired in 1930 at a cost of about \$171,000, as part of the site authorized by the act of January 10, 1929 (45 Stat. 1071), for the Longworth Building; however, square 636 was not used for this purpose. The Additional House Office Building Act of 1955, approved April 22, 1955 (69 Stat. 41), provided that square 636 would be available for the purposes of the 1955 act. The cost of square 636 is not included in the \$2.5 million for site acquisition shown in the Architect's estimate of cost. (See p. 8.)

Possession of the property on square 635 as authorized in the 1955 act was taken pursuant to a declaration of taking filed in September 1955. Final settlements were made early in 1956, and the cost of acquiring square 635 (about 4.7 acres) was \$2,333,096.

In addition, \$166,904 for incidental costs, such as appraisals, clearing the site, and subsequent property protection, was charged by the Architect to the Rayburn Building.

PREPARATION OF SITE--\$1,690,220

Most of this segment was for sewer relocation, which involved constructing a new sewer in square 635 as a relocation of the existing Tiber Creek sewer and connecting the new sewer with the city sewer system. The work also included some excavation and

foundation work for the building as the sewer is located beneath, and constitutes a part of, the building structure. The contract was awarded in December 1956 to Gunnell Construction Company, Inc., the lowest of eight bidders, in the amount of \$1,327,000. Contract changes totaling \$65,805 (construction changes of \$94,605 less liquidated damages of \$28,800) increased the final contract price to \$1,392,805. The contract was completed in December 1958.

Other costs aggregating \$367,449 were principally for changes in water and sewer lines, streets, and curbing (\$266,899) and for soils analysis and test borings.

FOUNDATION--\$8,830,000

This segment consisted principally of excavation, an excavation support system, foundation piles, and related foundation work. The contract was awarded in May 1958 to McCloskey and Company, the lowest of 13 bidders, at the bid price of \$6,666,000. Contract changes in the amount of \$2,164,004 resulted in a final contract price of \$8,830,004. In addition, unsettled claims aggregating \$996,000 relating to sheet piling and temporary bracing, which were disallowed by the Architect, are pending before a board of contract appeals. The contract was completed in September 1961.

The principal contract change was in the amount of \$1,262,553 and was a result of modifications in the design of the garage floors. It included an increase in the depth of the concrete foundation mat and the addition of five concrete lugs or extensions below the foundation mat. According to the Architect's records and discussions with the architect consultants, the foundation contract was awarded before final details of the building superstructure were available, and it was later found that stresses within the

garage areas were greater than first anticipated. The architect consultants decided that the change was needed to combat the combined effects of the stresses.

STRUCTURAL STEEL--\$7,208,700

The contract for the furnishing, delivery, and erection of the structural steel for the building was awarded in July 1958 to Bethlehem Steel Company, the lowest of four bidders, on a bid of \$6,907,500. Contract changes totaling \$301,151, of which \$283,887 was for damages in favor of the contractor because of delay in completion of the foundation work, brought the final contract price to \$7,208,651. The contract was completed in December 1961.

SUPERSTRUCTURE AND EQUIPMENT--\$55,500,000

This segment covered the construction of the building except for the preparation of site, foundations, structural steel, and furniture and furnishings. McCloskey and Company was the lowest of seven bidders on a bid of \$50,793,000, and the contract was awarded to this bidder in March 1960. A breakdown of this contract by types of work, which was submitted by the contractor for the purpose of progress payments, is summarized as follows:

<u>Type of work</u>	<u>Amount</u>
Concrete	\$ 9,996,604
Exterior marble	7,775,497
Heating, ventilating, air conditioning	5,922,800
Electrical	4,302,000
Masonry	3,272,334
Granite, limestone, and flagstone	3,191,000
Carpentry, millwork, and cabinetwork	2,467,779
Elevators and moving stairways	2,456,000
Plumbing	2,298,380
Furring, lathing, plastering	1,616,000
Interior marble	1,410,000
Aluminum and bronze	1,015,000
Other	<u>5,069,606</u>
	<u>\$50,793,000</u>

As noted on page 10, the contract work was completed in January 1965 but the contract had not been closed out at June 30, 1965. Changes negotiated to the latter date had increased the contract price by \$3,971,875 exclusive of unsettled claims filed by the contractor in the amount of \$141,456 at that date. The principal changes were:

Installation of cafeteria, exclusive of furnishings	\$880,000
Installation of swimming pool, including locker rooms, shower rooms, stairway and passenger elevator connecting swimming pool area with men's gymnasium, and other related facilities (see note a)	490,000
Relocation of the first-aid facilities and addition of women's health facilities	144,676
Installation of water stops at construction joints in the garage-level areas to prevent water seepage	143,135
Increasing the thickness of the structural concrete floor slabs in the second and third garage levels to facilitate the placing of conduits	120,661
Furnishing and placing top soil with a limestone formula, and a fiber-glass blanket, in designated areas (for landscaping)	111,886
Operation and maintenance of section of building occupied by Government personnel before completion of entire building	398,969

^aChange order issued in July 1965. The changes to June 30, 1965, totaling \$3,971,875 included the contractor's proposal of \$512,954 for this item.

FURNITURE AND FURNISHINGS--\$3,500,000

In May 1963 the Architect contracted with Messrs. John Harbeson, Wm. J. H. Hough, Wm. H. Livingston, and Roy F. Larson--architects of Philadelphia, Pennsylvania--for services as furniture consultants. These services included:

1. The preparation of necessary illustrations and details, specifications, and schedules showing the various types, quantities, and quality of furniture and furnishings and of typical layout drawings of each space of the Rayburn Building showing the arrangement of the various articles of furniture in each space.
2. The preparation of such full-size detail drawings as may be necessary to show the design and construction of all articles of furniture and other required items.
3. The preparation of integrated color schemes and submissions of sample materials.
4. The general supervision of the manufacture of the furniture and furnishings at the places of fabrication.
5. The supervision of installation of furniture and furnishings at the Rayburn Building.
6. The selection and specification of miscellaneous equipment for the cafeteria, including chinaware, silverware, and glassware.

The fee for the above services is an amount equal to 5-1/2 percent of the total cost of all furniture and furnishings procured for the Rayburn Building for which services are furnished. The cost of procurements for furniture and furnishings to June 30, 1965, aggregated \$2,873,554, of which the Architect had determined at that date that \$2,834,133 was subject to the consultant contract, and the architect fee on that amount was \$155,877.

The Architect awarded 20 contracts--most by competitive bid-- in the aggregate amount of \$2,636,645 for furniture and furnishings for the Rayburn Building. Contract changes totaling \$132,640 resulted in an adjusted price of \$2,769,285 at June 30, 1965. The principal changes were primarily to fill members' requests for additional chairs (\$55,200) and additional desks, tables, bookcases, and cabinets (\$44,344). In addition, purchases totaling \$104,269 were made for steel shelving manufactured by Federal Prison Industries, Inc. (\$64,848), and for miscellaneous items (\$39,421). As to the procurements amounting to \$39,421, the Architect had not determined at June 30, 1965, whether an architectural fee was payable. The principal contracts and award amounts are listed below:

Desks, tables, and case goods (cabinets and bookcases) for offices:	
Max Blau Contract Furniture, Inc., and Max Blau and Sons, Inc.	\$694,000
Sofas and easy chairs:	
Wycombe, Meyer Co., Inc.	139,947
Chairs for offices:	
Max Blau Contract Furniture, Inc., and Max Blau and Sons, Inc.	627,300
Carpet and cushions:	
E. P. Hinkel and Company, Inc.	521,001
Miscellaneous equipment (mirrors, lamps, and accessories):	
A. Pomerantz and Company	182,900
Furniture and furnishings for cafeteria (tables, chairs, chinaware, silverware, glassware, and utensils):	
M. S. Ginn and Company	(
E. B. Adams Company	(125,590
L. N. Hill Company	(

OTHER ITEMS--\$460,605

These items consist of:

Landscaping	\$197,900
Materials tests	120,221
Inspection of stone offsite	94,604
Sculptured Rayburn plaque	35,000
Electrical birdproofing	5,700
Streetlighting	<u>7,180</u>

\$460,605

Landscaping

The amount shown above for landscaping represents (1) the pro rata portion (about \$115,500) of a lump-sum contract in the amount of \$178,000 negotiated in July 1958 with Robert Wheelwright, Markley Stevenson, and Joe W. Langran for architectural services and (2) a competitive bid contract awarded in February 1964 to Greenbrier Farms, Inc., for furnishing and placing sod, plants, and trees on various sites in the amount of \$82,400. As discussed hereinafter, the amount of \$197,900 represented only a portion of the total landscaping costs.

The architectural contract was for landscape treatment and development of all the sites acquired pursuant to the 1955 act and, according to the contract, included surveys and studies, preparation of preliminary drawings and reports, and preparation of final drawings and specifications. The Architect determined that about \$115,500 of the total contract amount related to the site on which the Rayburn Building is located. The work so related included the selection and planning of the trees, shrubs, soils, and similar landscape materials for planting spaces in the three open courts and for all planting areas surrounding the Rayburn Building.

Certain other costs for landscaping were not included by the Architect in the above estimate of \$197,900. The contract change for \$111,886 under the superstructure contract (see p. 30)--for furnishing and placing top soil, and a fiber-glass blanket, in designated areas--was specifically in connection with the landscaping. Also, the top soil and fiber-glass blanket, valued at \$12,374 by the contractor, for the center court planting beds were furnished and placed under the original superstructure contract. Furthermore, we were advised by the Architect's office that ivy and other greens of an estimated value of \$36,000 were being furnished from the Botanic Garden nursery. On the basis of the above amounts, the total estimated cost of landscaping approximated \$360,000.

Material tests

These costs represent estimated reimbursements principally to the National Bureau of Standards and the District of Columbia Government for tests of various materials to determine whether they would meet the standards stated in the plans and specifications. Costs to June 30, 1965, totaled \$124,429.

Inspection of stone offsite

This item was for payments to contract inspectors for the inspection of exterior and interior marble and other stone as they were quarried, as they came from the saws, and before finishing, as well as during the progress of finishing and carving in the plants; inspection of each piece of finished stone for acceptability as to material and excellence of workmanship; and approval for conformance with approved samples, models, or originals for color, texture, and/or detail before releasing for delivery to the storage site at Washington, D.C. Total costs amounted to \$94,604.

Sculptured Rayburn plaque

A contract was negotiated in May 1963, and amended in October 1963, with Mr. Paul Manship in the amount of \$35,000 to sculpture in marble (1) a panel containing a half-length portrait figure of the Honorable Sam Rayburn, partly in high relief and partly in the round, and (2) an identifying inscription panel with architectural enframement in marble, to be located on the east wall of the north entrance hall of the Rayburn Building. Mr. Manship furnished the marble for the portrait figure. The contract work was completed in December 1964.

Electrical birdproofing

In December 1963 a contract was entered into with Brener Building Cleaning Company in the amount of \$5,700 for the installation of an electrical birdproofing system in those areas of the Rayburn Building where birds might roost, nest, or congregate. The contract work was completed in October 1964.

Streetlighting

These costs were primarily to provide streetlighting around the perimeter of the Rayburn Building. Costs incurred to June 30, 1965, totaled \$7,218.

ARCHITECTURAL AND ENGINEERING SERVICES--\$4,000,000

These services, which relate to the construction segments of the Rayburn Building proper, covered surveys, studies, preliminary plans, detailed drawings and specifications, and on-site liaison and consultation during construction. A negotiated contract for these services was executed in August 1955 with Messrs. John Harbeson, Wm. J. H. Hough, Wm. H. Livingston, and Roy F. Larson of Philadelphia, Pennsylvania. A preliminary report on the general features of the building and related construction, estimated cost and general specifications was submitted to the Architect in May 1956, and a final preliminary report was submitted in May 1957.

Compensation under the contract was payable at the rate of 5-1/2 percent of the actual aggregate costs of the contracts for the Tiber Creek sewer relocation, the foundation, the structural steel, and the superstructure. On the basis of the aggregate costs--exclusive of a reduction of \$28,800 for liquidated damages assessed the Tiber Creek sewer relocation contractor--of these contracts to June 30, 1965 (\$72,225,135), the architectural and engineering services to that date under the above contract amounted to \$3,972,382. The Architect was endeavoring to exclude from the fee computation the contract changes for which no services were performed by the consultants.

Architectural and engineering services for the subway, pedestrian tunnels, landscaping, and furniture and furnishings were contracted separately and are described in the sections of the report dealing with those cost elements.

SUBWAY--\$7,909,700

The subway was designated by the Architect as a separate project. Because it is attributable directly to and is an integral

part of the Rayburn Building, we have included its construction cost in the cost of that building.

This segment constituted the construction of a subway about 600 feet in length connecting the Capitol and the Rayburn Building and the furnishing and installation of related equipment, and it was contracted by the Architect under five separate contracts which, including changes, aggregated \$7,246,318 at June 30, 1965. Architectural and engineering services which were contracted separately for the subway system amounted to \$542,532 based on the aggregate of the five construction contracts to June 30, 1965. An additional fee of \$40,000 was allowed for plans completed but not used because of a major contract change. (See p. 63.) Other charges (\$43,080) for miscellaneous items, such as test pits and core drillings and street repair work, brought the total cost of the subway system to \$7,871,930 at June 30, 1965, exclusive of unsettled claims filed by the contractors in the amount of \$55,348 at that date. Each of these contracts is briefly described below.

Alterations in the Capitol

This work involved underpinning of the west side of the House wing and other required alterations in the Capitol. The contract was awarded in September 1961 to Buckley and Company, Inc., the lowest of five bidders, for \$2,695,000. Contract changes totaling \$952,993 resulted in a final contract price of \$3,647,993. The contract was completed in April 1964. The principal contract change was in the amount of \$665,000 for lowering the elevation of the underpinning, providing for two moving stairways, constructing a shaft for an elevator and adjacent stairs, modifying the subway elevator lobby and adjacent stairs, and constructing an access cofferdam (temporary structure built to exclude earth and water from

an excavation so that work may be performed) at the terminal entrance.

Subway and terminals

The contract for this work, which called for construction of the subway, the terminal at the House wing of the Capitol, and part of the terminal at the Rayburn Building, was awarded in August 1962 to Intercounty Construction Corporation, the lowest of four bidders, on a bid of \$2,060,126. Subsequent contract changes to June 30, 1965, amounted to \$156,783 and raised the contract price to \$2,216,909--exclusive of unsettled claims of \$44,680--to that date, at which time the work was essentially completed but had not been formally accepted.

Hoistways and related work

The construction of hoistways (elevator shafts) and related work for four new elevators to be installed at the House wing of the Capitol to serve the new subway was contracted in November 1962 to Grunley-Walsh Construction Company, Inc., the lowest of four bidders, for \$759,500. Subsequent contract changes to June 30, 1965, amounted to \$117,997 and raised the contract price to \$877,497 to that date, at which time the work was essentially completed but had not been formally accepted.

Elevators and moving stairways

In October 1962 a contract in the amount of \$273,513 was executed with Houghton Elevator Company, a division of Toledo Scale Corporation, for the installation of three new passenger electric elevators, one new plunger electric elevator, and two moving stairways in the west lobby of the House wing of the Capitol, to serve the new subway. The contract amount was the lower of two bids. Contract changes to June 30, 1965, totaled \$470. The contract work

was completed in February 1965, but the contract had not been closed out at June 30, 1965. Unsettled claims filed by the contractor at that date amounted to \$10,668.

Passenger cars

A contract for the development, manufacture, testing, delivery, and placing in operation of two 24-passenger electrically powered passenger cars was executed in January 1963 with General Electric Supply Company, a division of General Electric Company, for \$228,000 which was the lower of two bids. The Architect accepted the cars for beneficial use in April 1965, but the contract had not been closed out at June 30, 1965. Contract changes amounted to \$1,936 at June 30, 1965.

Architectural and engineering services

These services which consisted principally of preliminary studies, preparation of plans and specifications, and on-site liaison and consultation were performed by Messrs. Jesse M. Shelton and Alan G. Stanford of Atlanta, Georgia, under a contract negotiated in May 1958 and amended in September 1959. The contract provided for compensation at the rates of 5-1/2 percent of actual costs under the contracts for the subway and terminals and for the passenger cars and 8-1/2 percent of actual costs under the contracts for alterations in the Capitol, hoistways and related work, and elevators and moving stairways.

On the basis of the amounts of these contracts to June 30, 1965, and the above rates, the compensation to that date for the subject services totaled \$134,577 and \$407,955, respectively, or an aggregate of \$542,532, exclusive of the additional fee of \$40,000 referred to on page 37.

PEDESTRIAN TUNNELS--\$1,045,985

This work covered principally the construction of two tunnels under South Capitol Street connecting the Rayburn and Longworth Buildings and included six moving stairways. The contract was awarded in October 1962 to Young Associates, Inc., the lowest of four bidders, for \$880,400. The contract was essentially completed in December 1964, but it had not been closed out at June 30, 1965. Contract changes to June 30, 1965, increased the contract price by \$57,598.

The pedestrian tunnels were designated by the Architect as part of the project for remodeling the Longworth Building. However, the cost of the tunnels is being included by us in the cost of the Rayburn Building for the same reason as that stated in regard to the subway. (See p. 36.) The architectural and engineering services for the pedestrian tunnels were contracted to Messrs. Alfred Easton Poor and Albert Homer Swanke of New York City in August 1955, and the contract was amended in May 1958. Compensation was fixed at 8-1/2 percent of the total actual cost under the construction contracts for the project.

On the basis of the aforementioned construction contract for the pedestrian tunnels, the architect-engineering fee applicable to the pedestrian tunnels amounted to \$79,730 at June 30, 1965. Other incidental costs to that date totaled \$5,786. The above amounts total \$1,023,514 for the pedestrian tunnels at June 30, 1965.

ADMINISTRATION COSTS--\$3,564,475

These costs have been recorded by the Architect in a single set of accounts for all undertakings initiated under the 1955 act (see p. 4) and have been prorated by the Architect to the Rayburn Building and to the other undertakings in the estimates submitted

in appropriation hearings. Total costs of administration for all undertakings to June 30, 1966, were estimated by the Architect at \$4,905,047, of which \$3,210,475 was apportioned to the Rayburn Building.

This apportionment, however, considered only those costs which the Architect designated as applicable to the Rayburn Building proper and did not include the pro rata share of administration costs related to the construction of (1) the subway between the Capitol and Rayburn Building (\$7,909,700) which was shown as a separate project and (2) the pedestrian tunnels (\$1,045,985) which were included in the project for remodeling of the Longworth Building. The pro rata share of administration costs for these two items amounts to \$354,000 and increases the estimated administration costs apportionable to the Rayburn Building to \$3,564,475.

Total prorated administration costs incurred to June 30, 1965, applicable to the Rayburn Building, inclusive of the subway and tunnels, were \$3,323,523. Costs of administration were predominantly for salaries and wages for construction inspection on site, supervision, and general administrative functions; other costs in relatively small amounts were for drawings, blueprints, travel, and bid advertising.

RESERVE FOR COMPLETION OF UNDEVELOPED SPACE--
\$2,000,000

When the Rayburn Building was designed and constructed, certain space was left unfinished for expansion purposes. A reserve of \$2 million was established for completion of this undeveloped space upon its assignment by the House Office Building Commission for use as committee, subcommittee, or office rooms or for other purposes.

FINDINGS

The results of our examination center on contract changes, architect-engineering fees, and conformance with plans and specifications. In each of these areas we found certain matters which we believe warrant comment. Each of these matters is presented in some detail in the succeeding sections.

All construction work, exclusive of contract changes, and substantially all procurement of furniture and furnishings, which constitute the bulk of the costs of constructing and equipping the Rayburn Building, were contracted by publicly advertised competitive bidding. Our examination did not disclose any features of the solicitation of bids or the award of contracts that appeared to be questionable.

CONTRACT CHANGES

In terms of construction, cost, and administrative problems, contract changes constitute one of the most burdensome yet significant aspects of a construction project. It may be said that as to these problems an ideal construction project is one wherein the structural and facility requirements are so determined and the related plans and specifications are so developed as to obviate the need for contract changes other than those growing out of technological advances and unforeseeable events. This ideal is seldom if ever achieved, however, and most large construction projects experience some contract changes.

The reasons for avoiding or minimizing contract changes are several. The costs of changes are generally negotiated with the prime contractor on the basis of its estimated cost and profit thereon and therefore are not subject to the advantages of competitive bidding. As a practical matter it usually is not feasible to have another contractor do the contract change work, and, even in those cases where it might be feasible, the contractor on the job would have a decided advantage over any other prospective bidder.

In addition, changes frequently disrupt the sequence of construction operations and also require the removal or modification of work partially or completely done, both conditions usually resulting in extension of the construction time. Furthermore, changes add considerably to the administrative burden in the time and effort expended in developing the details of changes, negotiating prices, and handling the related paperwork.

All of these factors tend to increase the cost of the construction project and, although the measure of increase is generally not practical to determine, it is undoubtedly significant in large projects on which the number and aggregate amount of changes are of sizable proportions. Thus it seems reasonable that, barring extraordinary and unforeseeable events, the number, types, and amounts of contract changes generally reflect the degree of planning, decisiveness, and foresight devoted to formulating the design, layout, and facilities of the structure and to preparing the specifications therefor.

In regard to the Rayburn Building, individual changes were designated as supplements which were issued as the basis for starting work on the changes and thereafter one or more supplements were incorporated in a change order which was the formal instrument of amendment to the basic contracts. At June 30, 1965, about 1,450 supplements had been issued under the several prime contracts but all of them had not been formalized into change orders; those which had been formalized aggregated approximately \$8 million. According to the Architect's records, proposals by contractors for changes not formalized at June 30, 1965, totaled about \$668,000.

On the basis of our selective review of supplements, certain changes by their nature, size, or the circumstances of their occurrence seem appropriate for reporting to the Congress.

For the reasons noted above, we believe that these changes probably added significantly to the construction cost of the project. The extent of the additional cost is not measurable, however, although in several of the changes an indication of minor additional costs in certain specific segments of the change work was ascertainable.

We also found that for many changes documentation was lacking or insufficient to determine (1) the adequacy of analysis by the Architect of estimates submitted by the prime contractors in proposals on changes and (2) the basis on which final prices were agreed upon. In addition, certain proposals by the prime contractors were not in sufficient detail to afford a basis for considered judgment as to their reasonableness.

For the purpose of discussion in this report the aforementioned situations in respect of contract changes have been grouped under the headings designated hereafter. The costs shown for individual changes cited in the discussions under the designated headings are intended primarily to indicate the monetary significance of the changes. Except for those nonmeasurable costs that were implicit in contract changes for the reasons previously explained and those relatively minor items noted as avoidable, the costs of these changes did not represent additional costs that would have been avoided if the work covered by the subject changes had been included in the basic contracts.

Changes approved by House Office Building Commission

Some of the changes reviewed by us which have been grouped in this category represented items which, according to the record, were considered by the Commission during the design and planning stages but were excluded from the basic construction contracts as awarded, and thereafter were approved as changes during the construction period. Other changes were approved to meet certain situations which developed subsequent to award of the basic contracts. Several of the more significant supplements in this category are described briefly below.

Cafeteria--\$880,000

In May and June 1955 the Commission approved the inclusion of a cafeteria in the preliminary plans, but, upon approval in February 1956 of a cafeteria in the courtyard of the adjacent Longworth Building, the cafeteria was deleted from the plans for the Rayburn Building. In July 1959 the Architect advised the Commission that the cafeteria in the courtyard of the Longworth Building was already taxed to its limit and that at some future time it may be necessary to provide dining facilities in the Rayburn Building. The Commission approved the Architect's recommendation that the plans for the Rayburn Building include the installation of waste and feeder lines in an area which could be converted in the future to a cafeteria.

In May 1962 the Commission, in response to the Architect's inquiry, voted to proceed with the installation of the cafeteria as a change to the superstructure contract on the basis of plans for the cafeteria and estimates of cost which the Architect had presented. The Commission, upon recommendation of the Architect, approved acceptance of the contractor's proposal, subject to a cost not to

exceed \$922,000. Subsequent negotiations with the contractor resulted in a cost of \$880,000. An official of the Architect's office advised us that his office was aware of the need for the cafeteria before award of the superstructure contract in March 1960 but that the Commission would not approve it at, or prior to, that time.

We ascertained that, at the time that this supplement was approved, sheet-metal or duct work either was on the jobsite and not yet used or had been installed and had to be removed because it could not be utilized for the cafeteria; also, because it could not be used elsewhere in the construction it was scrapped. From data available to us, we could not make a reasonable estimate of the quantity of this material, but according to the Architect's representatives the material totaled about 7,200 pounds and was valued at approximately \$4,500. Furthermore, as discussed on page 67, the cost of the duct work, which appears to have been relatively high on the basis of authentic guide prices, was not supported by any documented justification.

Gymnasium annex--\$490,000

This supplement comprised the installation of a swimming pool, locker rooms, shower rooms, and related facilities including a passenger elevator and stairs to and from the main gymnasium. In May 1955 the Commission, in considering various accommodations submitted by the Architect, disapproved certain items including a gymnasium and swimming pool. In July 1956 the Commission approved the gymnasium but again disapproved the swimming pool.

The Architect in January 1962 advised the Commission that the Chairman of the House gym committee had requested, with the endorsement of the medical officer, that a swimming pool--20 feet by

60 feet--be provided in the Rayburn Building; that suitable space was available; and that a heated pool together with necessary locker facilities could be installed at an estimated cost of \$500,000. The Commission approved the request as a change to the superstructure contract.

The basic superstructure contract included installation of a knockout panel approximately the size of the swimming pool, which could be removed if the installation of the pool were subsequently authorized. At the time that the change was approved the panel had been placed and had to be removed.

We estimate that the cost of placing and removing the concrete and steel which was in the knockout panel was about \$19,000. This cost could have been avoided if the swimming pool had been approved before the finalization of the plans and specifications on which bids for the superstructure contract were let. However, installation of the knockout panel saved considerably higher costs that would have been incurred by the subsequent approval of the swimming pool if provision for the knockout panel had not been included in the basic superstructure contract.

Women's health facilities--\$144,676

It does not appear from the records that consideration was given to a women's gymnasium or health facility in the Rayburn Building before award of the superstructure contract. In May 1958 the Commission approved installation of an exercise and rest room for Congresswomen in the Longworth Building.

The Architect advised the Commission in January 1962 that women members of the House of Representatives had requested, with the endorsement of the medical officer, that they be provided with a gymnasium and shower room in the Rayburn Building and that

suitable space was available for that purpose. The Commission approved the request as a change to the superstructure contract, which included necessary relocation of the first-aid station as part of the change.

Clocks in members' offices--\$70,951

This supplement authorized installation of a clock with audio and visual legislative call signals in each member's private office. This item was considered by the Commission and disapproved in July 1959; however, wall clocks were authorized for other locations within each member's suite. The basic superstructure contract included installation of an empty conduit, outlet box, and cover for possible future installation of a clock in each member's office.

In late March 1963 the Architect informed the Commission that some members had indicated a desire for wall clocks to be placed in their private offices or to be placed in locations other than those called for by the contract plans. The Commission deferred decision pending receipt of cost estimates and early in May 1963 approved the installation of a wall clock with buzzer and lights in members' private offices at an estimated cost of \$43,300. However, during the period from March 1963 until the materials required for the installation of the clocks were delivered early in June 1963, construction proceeded, and principally because certain completed work had to be redone the cost of the change was increased by \$27,651 to a total of \$70,951.

A memorandum by the Architect's electrical engineer on this project stated that during this period all painting in the west half of the building had been completed and all the walls in the east half had been erected and that all affected existing outlets

had to be enlarged by chipping out a larger hole to accommodate the clocks, after which the holes had to be cemented and plastered. He stated further that practically all the extra work in the east half could have been avoided if the change had been approved before the erection of the walls.

Operation and maintenance of
building equipment--\$398,969

In August 1962 and March 1963 the Commission approved the transfer of personnel of the Architect's field office and of congressional personnel from buildings known as the General Outdoor Advertising Building and the George Washington Inn to space in the basement of the Rayburn Building to permit the demolition of those structures in connection with the construction of underground garages in the area in which those structures were located.

The subject supplements provided for operation and maintenance of mechanical and electrical equipment by the superstructure contractor for those sections of the building (approximately 44,000 square feet) occupied by the aforesaid personnel. The cost of these services totaled \$398,969 for the period from January to November 1964 at which time the Architect's forces took over the functions. These changes averaged about \$38,000 a month based on direct costs, overhead at 10 percent of direct costs, profit at 10 percent of direct and overhead costs, and the contractor's 10-percent commission on work performed by subcontractors.

The cost of \$398,969 for these services exceeded by about \$163,000 what it would have cost the Government if Architect forces had performed the services during this period, principally because of the lower wage rates payable to the Architect's forces and the profit allowed to the contractor. According to the Architect's office, it would not have been feasible for Government forces to have

performed these services prior to November 1964 because (1) the mechanical and electrical systems were not complete and therefore had not been accepted in their entirety and (2) the Government would have been subject to possible claims in the event that any malfunction or other difficulties were encountered.

Records available to us indicate that the subject supplements would not have been necessary if construction of the underground garages had been deferred at least until installation of the mechanical and electrical systems had been accepted which presumably would have been no later than November 1964. The records indicate also that there did not appear to be any compelling reason why the construction of the underground garages could not have been so deferred since the area on which they were being constructed, other than that on which the two structures were located, was being used for parking cars which, when construction of the underground garages was started, were simply moved into completed garage space in the Rayburn Building.

Additional furnishings--\$99,544

The types and quantities of furnishings specified in the contracts with the various suppliers were based on typical layouts for each member's suite and for committee and subcommittee rooms in accordance with plans and specifications drawn by the architect consultants. After the suites and committee and subcommittee rooms were assigned, which was several months after the contracts had been awarded, requests were made by members for changes in or additional furnishings to serve their individual needs.

In February 1965 the Commission authorized the Architect to use his judgment in regard to such requests, subject to the stipulation that requests involving substantial additional expenditures

be referred to the Commission. Thereafter two supplements aggregating \$99,544 were issued for additional chairs, desks, tables, bookcases, and cabinets. The basic contracts for these items, which totaled \$1,321,300, included a unit price schedule for increases or decreases in the contract quantities. However, the unit prices for these additional items were generally about 10 percent higher than the unit prices stated in the contract because the contractors were under no obligation to accept further orders under the original contracts.

Comments by the Architect of the Capitol

The Architect pointed out that, with regard to the changes hereinabove discussed, recognition should be given to the passage of time, the changes in the membership of the Congress and of the Commission, the views of the individual members, and the fact that they and the Architect exercised their best judgment at the time that the decisions on these changes were made.

In regard to the changes for the operation and maintenance of building equipment (see p. 49), the Architect claimed (1) that the George Washington Inn was an old, dilapidated building, an eyesore in the community, and somewhat of a fire trap and that its use by House personnel was a constant source of concern to the Commission and the Architect and (2) that it was desired that the garages be commenced as soon as possible in view of the serious lack of parking for members and employees of the House.

As to the statement of the Architect about the George Washington Inn, we are not in a position to make a judgment on the expenditure of approximately \$400,000 in lieu of continued occupancy for an additional 10 months but we believe that it is an appropriate matter for reporting by us to the Congress.

Use of the added parking space that would become available upon completion of the underground garages was at least several years away at the time that the transfer of personnel from the old buildings was approved. This situation raises the question of whether postponement of completion of the added garage space for 10 months in order to save approximately \$400,000 would have been seriously inconsistent in terms of cost with the urgency of obtaining such space as soon as possible.

Changes resulting from finalization of plans
for work under other contracts

Changes in this category were attributable to the decision of the Architect to schedule construction by segments and to award separate contracts for each segment, prior to the finalization of plans and specifications for other segments. For example, the foundation and structural steel contracts were awarded before the plans and specifications for the superstructure were finalized and the superstructure contract was awarded before plans and specifications were completed for the pedestrian tunnels between the Rayburn and Longworth Buildings and for the subway between the Rayburn Building and the Capitol. As a consequence of the Architect's decision, changes in some contracts already awarded were necessitated when the plans and specifications for other segments were subsequently completed.

According to the records of the Architect, it was estimated in July 1956 that complete plans for construction of the Rayburn Building could not be ready before late 1958 or early 1959. To expedite construction, the Architect decided not to wait for completion of all plans but to divide the construction into the following design and work segments under separate contracts for each.

1. Tiber Creek sewer relocation
2. Excavation and foundation
3. Structural steel
4. Superstructure

Although not considered in the Architect's decision in respect of the above four segments, the construction of the subway and of the pedestrian tunnels was also let under separate contracts.

The architect consultants for the Rayburn Building stated that it is the usual procedure to design a building from the top down which means that the design development phase of the superstructure would be substantially completed before the design of the foundation. The Architect's office informed us that, when the foundation is designed before the design of the superstructure is completed, certain assumptions have to be made which would not be necessary if the design of the superstructure had been completed and also that, in designing the foundation ahead of the superstructure, it was not unusual for changes in the foundation design to be necessary as final design of the entire building progresses.

The Architect's office estimated, however, that, by departing from the conventional design sequence, the completion of the Rayburn Building was advanced by about 2 years and escalation of costs at a rate of about 4 percent a year was avoided.

We are unable to affirm or dispute either of the benefits claimed by the Architect's office principally because (1) in the more than 8 years since construction was started, extensive delays were encountered which, by reason of their close tie-in with design problems, tend to becloud the claim of advanced completion and (2) bids, especially on large construction such as the Rayburn Building, are influenced to a large degree by the forces of competition, local conditions, technological advances, and the level of construction activity both generally and as to individual contractors at the time of bid, and these factors could distort in varying degree the effect of rising costs.

Moreover, such merit as the asserted benefits may have stands in contrast to the disadvantages previously noted (see p. 42), which are implicit in the changes required to realize these

benefits. Contract changes examined by us, which were directly attributable to this situation, aggregated \$2,253,115.

The largest of these changes (\$1,262,553) was for strengthening some areas of the foundation to resist certain stresses which became known as the design of the superstructure was being finalized. The record indicates that the architect consultants were aware of the need for this change within a month after the foundation contract was awarded, but the record is silent as to any prior information about the nature of the change or the circumstances leading up to it.

Because of the complex technical nature of the change, the Architect's office referred us to the architect consultants for an explanation of the information learned shortly after the contract award and why such information was not available or obtainable before the contract award. The explanation given to us by the architect consultants is summarized in the following paragraphs.

At the time of the foundation design, only preliminary designs of the structural steel and the floor systems of the superstructure were available. However, since the basic requirements such as earth pressures, column spacings, and loads were known, the architect consultants, at the time of the award of the foundation contract, considered the foundation plans and specifications to be complete and no major changes were anticipated.

Shortly after the award of the foundation contract, considerable information became available on the final details of the building since the design of the superstructure had advanced in the meantime. At about the same time it was decided to eliminate the heating of the garage areas. (The final report of the architect consultants on the preliminary plans and specifications issued in May 1957--a year before the award of the foundation contract--did not provide for heating the garage areas, although an earlier preliminary report included a specific provision for such heating. Apparently the question of whether to provide for heating the garages was not decided finally until about a month after the award of the foundation contract in May 1958.)

As a result of the decision to delete the heating, the original designs of the garage floors were reviewed as part of their final design. This review indicated that the floors of the garages were subject to much greater fluctuations in temperature and, consequently, there were larger movements due to expansion and contraction than were anticipated in the preliminary design which was predicated on a heated garage.

These increased thermal movements together with other movements of the floors, such as shear deflections--usually of only minor importance but found to be significant in this structure--and bending deflections, indicated the need for a modification of the original design concept of the garage floors in order to reduce secondary stresses in the building columns and in the floor slabs.

The architect consultants decided to divide the garage floors into sections by means of expansion joints. Doing this resulted in the need for a different method of resisting the earth's pressures, and the architect consultants believed that the most feasible

method would be to transmit these pressures to the foundation through concrete walls or buttresses within the building, which in turn called for strengthening the foundation.

This strengthening occurred where interior buttresses (shear walls) were added around the perimeter of the building. At the eastern end of the foundation, the thickness of the foundation mat was increased and five concrete lugs or extensions, each 420 feet long, 8 feet wide, and 8 feet deep, running north and south across the entire width of the building, were added. Elsewhere only the pile caps under the shear walls were increased in size and depth.

An alternative method would have been to increase the thickness of the floor slabs of the garages, but this would have reduced building space and the resulting increased weight of the superstructure would still have required some changes in the foundations.

In view of the complex technical nature of this change and the paucity of the Architect's record and knowledge of it, we are not in a position to express any view as to whether (1) the change should or could have been incorporated in the basic contract and (2) if it had been so incorporated, the character, scope, or operational sequence of the foundation work would have been modified with possible reduced overall cost. The architect consultants responded in the negative to both these suppositions.

Other changes necessitated by the nonconventional sequence of design included the following items.

1. Increased working and waiting time of pile-driving equipment and personnel--\$305,000 under the foundation contract--which was caused principally by the above-described change which required the driving of foundation piles in a manner and under conditions substantially different from those contemplated under the basic foundation contract.

2. Costs incurred by the suspension and changed sequence of the structural steel work--\$283,887 under the structural steel contract--because of delay in completion of the foundation work which in turn was caused by changes in the foundation contract, principally the change for strengthening the foundation.
3. The addition of certain permanent support below the subway terminal area--\$101,451 under the foundation contract--the need for which was known at the time the foundation plans were released for bidding but the design for which was dependent upon the layout and location of the subway terminal which had not then been determined.
4. Revision of the construction of the subway terminal at the Rayburn Building to line it up with the angle of approach of the subway from the Capitol--\$83,924 under the superstructure contract. The design of the subway was in its preliminary stages at the time the superstructure contract was awarded.
5. Relocation of a 20-inch sewer--\$51,031 under the superstructure contract--to avoid interference with the subway between the Rayburn Building and the Capitol because the design for the subway which was finalized after award of the superstructure contract was different from the design originally anticipated.

The above situation raised the question of whether, in terms of the total cost of a project, it would be more economical to complete all plans and specifications before awarding any construction contracts and to solicit bids and award contracts on a single-contractor basis. Information on such a practice, which we ascertained from several technical sources, is summarized below.

From the records of GSA, we learned that 16 of 17 single-building projects having a construction cost of more than \$10 million each, which were completed by that agency during the period July 1, 1961, to December 31, 1966, were constructed in accordance with the above practice. Also, in response to our informal

inquiries, officials of several other Federal agencies advised us that their agencies generally follow this practice in the construction of single buildings.

Further, we were informed by the American Institute of Architects (AIA) (see app. VIII) that it is the general practice in public and private construction to complete all design work for entire structures before awarding contracts and to award single contracts for the entire construction.

The AIA expressed its belief that any savings realized by separating a project into phases for early construction of known portions of the work in order to avoid rising costs is offset by the additional costs for coordinating subsequent work with previous work, by the added services required by the architects and engineers, and by the increased chances of change orders to correct unforeseen conditions.

With respect to the single-contract system, the AIA stated that it believes that prospective owners--public or private--are best protected by this system because it places responsibilities and liabilities in one place and results in better programmed, better coordinated, and more thoroughly studied solutions to design problems and that the only disadvantage claimed for the single-contract system is that it is necessary to pay the prime contractor overhead and profit on subcontracts which might have been saved by direct award of separate phases. However, the AIA stated also that it believes that the aforementioned advantages offset this disadvantage by a large margin.

The Associated General Contractors of America (see app. IX) expressed a position in the above matters similar to that of the American Institute of Architects.

Comments by the Architect of the Capitol

The Architect agreed that when time is not a factor the procedure of completing all plans before initiating construction is the obvious course to follow. He maintained, however, that, in the case of the Rayburn Building, time was an important consideration since the Architect was ordered by higher authority to proceed with certain segments of the project as expeditiously as possible. Moreover, he estimated that, on the basis of building index costs, this procedure saved the Government between \$1.4 million and \$1.8 million and an additional \$700,000 on the structural steel contract by not having this contract go through the general contractor.

With regard to the change of \$1,262,553 on the foundation contract, the Architect stated that this work was necessary whether it was included in the basic contract as bid or as a contract change and that whatever saving that could have been realized if it had been included in the basic contract, together with the amounts for the items listed on pages 57 and 58, would have been more than offset by the savings noted above and the fact that much time was saved in construction.

Our views on the monetary and time savings claimed by the Architect and on the change in the foundation contract are stated on pages 54 and 57, respectively. According to AIA, phased construction can accelerate construction of the total project but is generally more costly than construction as a unified undertaking under single-contractor responsibility.

On the basis of our discussions with technical sources, we believe that the claim by the Architect of a \$700,000 saving on the structural steel contract is questionable since it cannot be determined (1) how much additional administrative costs were incurred by

the Architect's office because of the necessity for his office to coordinate the structural steel work with other construction, (2) how much could have been saved by the better scheduling of equipment and labor forces which would have been possible by a single contractor for both the structural steel and the superstructure, and (3) what the variances in profit would have been between separate contracts and a single contract.

Changes directed by the Architect of the Capitol

Many contract changes were made at the direction of the Architect, principally for the addition or substitution of facilities or materials and the relocation of facilities. From the pertinent data examined by us, the work relating to certain of these changes had been considered or we believe should have been considered in the development and review of the plans and specifications. As to some of these changes, the record states that the related work was omitted from the basic contracts to economize on costs; as to other changes, the need or desirability for the items or work involved apparently was overlooked in the development and review of plans and specifications although they did not seem to be of an unusual nature.

The most significant change was in the amount of \$665,000 and was primarily to reduce by about 80 feet the walking distance from the Capitol end of the subway to the elevators in the Capitol by extending the subway tracks at that end and relocating the moving stairways from the subway terminal outside the Capitol to inside the Capitol. The work principally involved lowering the underpinning of the Capitol, providing for two moving stairways, constructing an elevator shaft, modifying the subway elevator lobby and adjacent stairs, and constructing an access cofferdam.

We were informed that this item was considered at the time the original plans and specifications for the subway were being prepared but was rejected for reasons of cost. The record is not clear as to why it was reinstated as a change after the contract for alterations in the Capitol had been awarded and work thereunder was in progress. This reinstatement brought about certain adverse cost consequences.

One of these consequences which we were able to pinpoint was the necessity for reexcavating earthwork and removing certain underpinning which had been placed. We ascertained that the cost of placing this work and its subsequent removal because of the change added a minimum of about \$40,000 to the contract cost, which would not have been incurred if the change had been incorporated in the basic contract. Another consequence related to architect fees. Because of the major change (\$665,000), the plans and specifications for the subway and terminals were substantially revised, and, since they had been completed before the decision to make the major change, the Architect decided that the architect consultants were entitled to an additional fee of \$40,000.

Another item of cost, over and above the \$665,000 incurred because of the change, was in the amount of \$65,806 under a separate change principally for the use of a crane from December 1962 to March 1964 to handle spoils and materials by the access cofferdam constructed under the above-described change. The basic contract did not provide for a cofferdam.

Certain changes for the substitution of materials could have been avoided if the Architect had accepted suggestions by the architect consultants or considered other available information before awards of the basic contracts. These changes involved (1) \$108,474 for the substitution of pipe piles for thin-shell piles and (2) \$34,037 for the substitution of lead-coated copper through-wall flashing for zinc-copper or plain copper through-wall flashing.

Another change in the amount of \$51,501 was made to modify four freight elevators to combination freight-passenger elevators so that they could safely carry passengers in the event of fire or

other emergency. It appears that the need for this safety factor should have been recognized in the original design plans, a need affirmed by a memorandum in the files of the Architect, and also in the Architect's review of the original design plans. The record indicates that the need was considered during the bidding period on the superstructure contract but was deferred because the time required to review the plans and specifications would have delayed receipt of bids and award of the contract.

Certain other changes seem to us to be the type which would be considered ordinary features of a structure such as the Rayburn Building or which, from the record, could have been resolved in the preparation and/or review of the original plans and specifications, and therefore would be included in the basic construction contracts. Examples of these changes were:

1. Increasing the thickness of the structural concrete floor slabs in certain areas of the second and third garage levels to facilitate the placing of conduits and to prevent conflict with the reinforcing steel--\$120,661. Related to this change was another for \$44,498 to relocate certain reinforcing steel bars in some areas of the second garage level, which we were informed by Architect personnel would have been unnecessary if the floor thickness had been increased initially.
2. Lowering the subsurface water level in the east half of the construction by the use of a well point system in order to render the soil at the final excavation level fit for receipt of the foundations--\$83,840. This change was made because the Architect considered that the specifications were ambiguous as to the contractor's responsibility for control of subsurface water conditions.
3. Furnishing and placing top soil and fiber-glass blankets in designated planting bed and lawn areas, exclusive of the center court which was provided for in the basic contract--\$111,886.

4. Placing lighting in 29 elevator shafts as a safety precaution--\$28,159. Provision for such lighting was the usual practice for the buildings constituting the Capitol enclave. The Architect's electrical engineer informed us that about 50 percent (\$11,500) of the labor cost of this change could have been avoided if the work had been done under the basic superstructure contract.
5. Anchoring the marble stones in the pediment of the Independence Avenue portico by means of anchor bolts and tie rods--\$37,261. The Architect's stone specialist informed us that the contract plans and specifications did not provide a means for adequately securing the stones to the structural frame.

Comments by the Architect of the Capitol

The Architect explained that the change involving the subway grew out of the concern of the late Speaker Rayburn, during the latter part of his Chairmanship of the Commission, about the high rate of deaths among members of the House of Representatives; that the Speaker requested the Architect to make an investigation of various means of alleviating physical strain on members with known serious ailments, including an investigation of the subway tunnel to see that walking distances were as short as possible; that early in 1962 the Architect discussed with the members of the Commission the lengthening of the tunnel and made known the feeling of the late Speaker Rayburn; and that the Commission concurred in the extension of the tunnel. He acknowledged that documentation in the form of file memoranda or other written record had not been made on the above events.

Comments by the Architect on other changes discussed in this section were not in conflict with our report except the changes for the substitution of pipe piles and lead-coated copper through-wall

flashing (\$108,474 and \$34,037) and the change for furnishing top soil, etc. (\$111,886). We did not consider that the reasons advanced by the Architect in these cases controverted the information on which our findings were based.

Documentation relating to contract changes

Our selective review identified many changes for which (1) the contractors' proposals did not contain sufficient specifics to permit analysis as to the reasonableness of the proposals and (2) the recorded data underlying the review by the Architect of the contractors' proposals and evidencing the price negotiations with the contractors were not sufficiently informative to afford a sound basis for judgment on the effectiveness of the Architect's reviews or the reasonableness of the final prices agreed upon.

The above inadequacies related principally to the verification of unit prices and material quantities, labor rates and hours, equipment rental rates and hours of usage, and the specifics of reductions resulting from price negotiations.

A memorandum written in July 1965 by an engineer in the Architect's office stated that initial contractor proposals on changes under the contracts for the Tiber Creek sewer relocation, the foundation, the structural steel, and the superstructure had been reduced by about 13 percent overall. These reductions are tangible evidence that the proposals were reviewed by the Architect's office. In the absence of adequate documentation of these reviews, however, we are unable to say whether they were sufficiently effective to ensure that the final prices which resulted from these reductions were reasonable.

The instances described briefly below are illustrative of the aforestated inadequacies.

1. The superstructure contractor's proposal for the installation of the cafeteria included an estimated requirement of about 115,000 pounds of sheet metal and related items. We were unable to find evidence that these estimated quantities were checked by what

is known as a quantity takeoff to the plans and specifications, although Architect personnel claimed that detailed reviews were made.

The importance of a quantity takeoff as a check on estimates of material requirements is indicated by the experience with the sheet-metal work for the gymnasium annex, wherein a quantity takeoff by the Architect personnel disclosed that the contractor's proposal was overstated and was accordingly reduced. Because of the lack of substantive documentation of a review of the contractor's estimate of 115,000 pounds in the subject instance, we are unable to say whether this estimate was or was not reasonable.

2. Architect personnel informed us that the cost of duct work is computed on a pound basis determined by dividing the total of the costs of the applicable material, equipment, and labor by the number of pounds. According to the annual cost data guidebooks "Building Construction Cost Data" published by Robert Snow Means Company, the cost of a galvanized duct system was between 75 cents and \$1 a pound at the time of the contract changes noted below. The prices of duct work for certain changes under the superstructure contract were considerably more than the applicable Means guide prices.

For example, the cost of the duct work on the contract changes for the installation of the cafeteria and for the addition of the women's gymnasium and relocation of the first-aid facilities which totaled about \$226,000, excluding allowance for overhead and profit, was approximately \$101,000 more than the comparable cost computed at the highest rate stated in the Means guidebook.

On several occasions the architect consultants had questioned the high cost of duct work and had also stated that the duct work proposals by the contractor were not in sufficient detail to enable

proper checking. Architect personnel attributed the higher costs to the need for more specialized types of items than are normally required and to difficulties of installation because of limited working space in certain areas. Architect personnel also stated that the questions of the architect consultants as to the high cost of duct work were resolved to the latter's satisfaction although such resolution may not have been documented.

Because of the lack of essential information of record, we cannot say whether the cost of duct work on changes under the superstructure contract was higher than it should have been but, on the basis of the Means guide prices and the reservations of the architect consultants, it seems that the Architect should have explored the reasons and justified the cost by adequate documentation in the record.

3. The superstructure contractor submitted a proposal in the amount of \$159,677 for the contract change to increase the floor slab thickness in certain areas of the garage levels to facilitate the placing of conduits. At a meeting of Architect and contractor personnel, a final price of \$120,661 was agreed upon.

The record contained no information as to the basis on which the final price was determined or as to the Architect's evaluation of the contractor's proposal for use in entering upon negotiations with the contractor. Although certain notations had been made on the contractor's proposal, we could not ascertain from the Architect engineer who made them, the extent to which they were employed in the negotiations. Architect personnel claimed that, although adequate documentation is desirable to support negotiated prices, the nature of proceedings at such meetings makes it difficult to record the specific items on which price revisions are agreed upon.

4. The contract change for major revisions in the underpinning of the Capitol, on which the contractor submitted a proposal of \$737,730, was negotiated for \$665,000 at a meeting in December 1962. The proposal consisted of (1) \$129,314 for additional labor costs for loss of production and efficiency due to the need to operate through the access cofferdam--one of the items of construction under the change--which was a radical departure from the basic contract, (2) \$604,260 to reduce the walking distance from the Capitol end of the subway to the elevators in the Capitol (see p. 62), and (3) \$4,156 for miscellaneous small items.

We found no record of the December 1962 meeting in the files, and Architect personnel stated that none was made. The Architect's assistant superintendent of construction informed us that most of the reduction of \$72,730 (\$737,730 less \$665,000) represented a decrease in that portion of the contractor's proposal which represented the additional labor costs of \$129,314. The files contained no evidence indicating that this portion of the contractor's proposal had been evaluated. Further, notes prepared by the assistant superintendent stated that the contractor's claim for these additional labor costs should have been excluded from negotiations at that time because it had significant ramifications which required extensive research.

As to the work which the contractor estimated at \$604,260, the Architect and the architect consultants had prepared separate estimates of \$532,545 and \$478,659, respectively. The files disclosed no information as to what consideration was given to these estimates in the negotiations, other than notations by Architect personnel which indicated that the estimate of the architect consultants was considered too low.

If, however, the reduction of \$72,730 for the entire change was applied principally to the contractor's claim for additional labor costs as noted above, it would mean that the contractor's estimate of \$604,260 for other work was accepted substantially as submitted despite the considerably lower estimates of the Architect and architect consultants, which would pose the question of whether the most reasonable price was negotiated.

Comments by the Architect of the Capitol

The Architect claimed that change proposals of contractors were carefully checked, validated when in order, and returned to the contractor when not; that the illustrative changes cited in the previous pages involved extensive negotiations with the contractor; that equitable adjustments were made in arriving at final prices; and that, for such negotiation sessions, there could be no complete documentation of all the details which result in a final firm figure that both parties would accept. The Architect further stated that he considers the documentation of changes to be generally adequate for the purpose of his office but that technical architectural, engineering, and construction details and other minute items considered in the settlement of each change order were not documented in such a way that auditors with no training in these fields could understand every phase of the negotiation.

As described on page 67, the kind of documentation with which we were concerned related to basic matters of contract administration and such is evident in the illustrative instances heretofore described. We believe that this kind of documentation--verification of unit prices and material quantities, labor rates and hours, equipment rental rates and hours of usage, and data on the

specifics of reductions resulting from price negotiations--is standard management practice in contract negotiating since it is the only evidence of how the review responsibility has been discharged and is the primary source of future reference as to the basis upon which contract changes have been finalized.

Moreover, we submit that this kind of documentation is not of such technical nature as to be identifiable only by expert estimators and cost analysts with construction experience and that, in our opinion, neither outside estimators nor even the Architect's expert estimators can determine from the Architect's recorded data the extent to which changes were reviewed or the prices of individual components of changes were reduced.

Conclusions

In the forepart of this report, we pointed out the disadvantages of contract changes, particularly the additional costs which they usually generate. The discussion in the immediately preceding sections notes that the changes to the several contracts numbered about 1,450 and totaled approximately \$8 million to June 30, 1965, and indicates that some of the changes were unique as to their nature and circumstances. The discussion further indicates that the necessity for many of these changes could or might have been avoided and that a more qualitative job could have been done in the documentation of many changes and of the review thereof by the Architect.

We believe that the added costs that are implicit in contract changes may be substantially reduced in future construction if the significant features that should be included in a construction project can be decided upon before finalization of the plans and specifications in such conclusive manner as will minimize extensive changes, particularly the reinstatement of features previously excluded and the deferral of features in contemplation of subsequently including them as contract changes.

We believe further that there is need for an effective system in the Architect's office which will ensure a more informative record on contract changes and which will include adequate specifics on contractors' proposals, negotiations thereon with the contractors, and the basis on which final prices were agreed upon.

As previously pointed out (see p. 54), the benefits claimed by the Architect's office in departing from the conventional design sequence are not clearly demonstrable. It is our view that the Architect should consider the practices which it appears are generally followed in most large construction, namely that (1) in the

absence of compelling circumstances, the plans and specifications for all segments of construction should be finalized and appropriately integrated before the initiation of any construction and (2) bids should be solicited and contracts should be awarded on the basis of single contractor direction and responsibility. According to technical sources, these practices contribute to more orderly, expeditious, and economical construction operations and contract administration.

Comments by the Architect of the Capitol

In commenting on the above conclusions, the Architect stated that his office (1) did not disagree with the principle of including all significant features in the original plans but that these matters were not always determined by his office, (2) considered that documentation was adequate for use of the Architect's skilled estimators but might not have been sufficient for detailed analysis by auditors not experienced in construction, and (3) would not disagree with the practices followed by others engaged in construction provided that time was not a factor, but, in the case of the Rayburn Building, time was an important factor since the Architect was ordered to proceed with certain segments of the project as expeditiously as possible. With regard to item 2, we have stated our views as to documentation in response to the Architect's detailed comments on that subject as described at page 71.

ARCHITECT-ENGINEERING FEES

The contracts for architectural and engineering services for the various segments of construction and for auxiliary requirements were negotiated with selected firms, and the fees payable were stated in percentages of the actual costs of the related segments except for one contract for which the fee was stated in a fixed amount.

Architect fees--construction

As noted in the forepart of this report, the Architect entered into a contract with Messrs. John Harbeson, Wm. J. H. Hough, Wm. H. Livingston, and Roy F. Larson of Philadelphia, Pennsylvania (HHLL), in August 1955 for architectural and engineering services concerning the Tiber Creek sewer relocation, the foundation, the structural steel, and the superstructure in the construction of the Rayburn Building. The contract provided that the contractor was to be compensated at the rate of 5-1/2 percent of the total cost of the construction of the above segments. This rate was in line with recommended minimum rates approved by the Washington-Metropolitan Chapter of the American Institute of Architects in June 1947.

Based on the actual aggregate costs of the above segments of construction to June 30, 1965 (\$72,225,135), the consultant fee to that date amounted to \$3,972,382. Of the fee, \$3,613,142 relates to the contract award amounts and \$359,240 relates to contract changes.

In considering the reasonableness of the fee payable under the HHLL contract, we consulted with architect officials of the GSA since that agency is the major office building construction agency of the Government. We ascertained that, whereas the fee under the HHLL contract is based on actual construction costs including the

cost of contract changes, the fee under a contract with GSA is based on its estimated construction cost to which is applied a rate, as set forth in a table of prescribed rates, to arrive at a lump sum which is incorporated as such in the contract. These prescribed rates vary in accordance with the nature, estimated cost, and complexity of the construction projects.

With regard to contract changes, GSA negotiates a separate fee for each change for which additional services are rendered by the consultants. This fee is computed on the basis of the estimated direct costs to the consultants plus an allowance for overhead and profit.

GSA officials advised us that GSA's many years of experience and its repeated business with the same firms indicate that its table of rates is reasonable even though these rates are lower than those recommended by the American Institute of Architects. They further informed us that architect firms favor Government business because of the prestige that generally attends Government construction projects.

It is not intended to imply that the method followed by GSA necessarily results in a proper fee. A number of Federal agencies have prescribed policies which provide for the negotiation of architect-engineering compensation in a stated amount based on the estimated cost of the architect-engineering services or on a combination of this and other methods including the percentage of estimated construction cost.

In our report to be issued to the Congress shortly on a Government-wide review of the administration of certain statutory and regulatory requirements relating to architect-engineer fees, we are stating our views on the most appropriate basis for negotiating

fees for architect-engineering services. In our review of the compensation paid for architect services for the Rayburn Building, we used the GSA method because that agency is the major Federal agency concerned with the construction of buildings and thus its determination of architect fees afforded the most comparable basis for reviewing the fee paid for the Rayburn Building.

In our discussions with the GSA architect officials, we informed them of the same general data on the overall characteristics of the building that the Architect had provided HHLL as design criteria. (See p. 11.) The GSA officials advised us that GSA's table of rates which was in effect in 1955 would be generally applicable to the Rayburn Building and that, although the basic rate in the case of the Rayburn Building would be about 3-1/2 percent of the estimated construction cost, they were of the opinion that a rate of 4 percent would be reasonable, predicated on the complexity and the extensive detail involved in designing the Rayburn Building and subject to the comparability of the architectural services required under the HHLL contract and those required by GSA.

Comparison of the detailed services required by the Architect and those generally required by GSA identified certain services which were required by one but not by the other. The GSA architect officials reviewed these services at our request and estimated that the services under the HHLL contract which were additional to those required under a GSA contract would cost about \$243,000.

The principal item of additional services was a requirement by the Architect (not generally required by GSA) for a full-time representative of the architect consultants to be resident at the project for on-site liaison and consultation during construction.

The GSA officials estimated the cost of this service at about \$168,000 for the period from the beginning of construction in January 1957 to June 30, 1965.

The Architect did not prepare independent estimates of the construction cost of the Rayburn Building, and none had been prepared at the time that the contract with HHLL was negotiated. As noted earlier in this report (see p. 6), HHLL prepared several estimates and the final estimates on which bids were solicited totaled \$74,123,372 for the four segments of the construction referred to above. The actual contract awards for the four segments of construction aggregated \$65,693,500.

The following tabulation shows the fee that would have been authorized by GSA predicated on the above considerations and the fee that is payable under the HHLL contract for approximately comparable services. The final and highest estimate of HHLL was used as the basis for application of the GSA rate and contract changes were excluded since the method of compensation provided in the HHLL contract and that prescribed by GSA for such changes did not lend themselves to being made comparable.

	<u>GSA criteria</u>	<u>HHLL contract</u>
Fee rate	4%	5-1/2%
Estimated construction cost	\$74,123,372	\$ -
Contract award amount	<u>-</u>	<u>65,693,500</u>
Fee	2,964,935	3,613,143
Additional services under contract of Architect	<u>243,000</u>	<u>-</u>
Fee	<u>\$ 3,207,935</u>	<u>\$ 3,613,143</u>

As shown by the tabulation, the fee payable under the HHLL contract is \$405,208 more than it would have been under the criteria applied by GSA.

In respect of contract changes GSA, as previously noted, allows additional architect fees only in those changes for which additional services are rendered by the architect consultants. Under the HHLL contract the architect consultants generally receive additional fees on all contract changes which result in additional costs regardless of whether services were required. This point is specifically illustrated by certain changes in the structural steel contract wherein the contractor was paid damages in the amount of \$283,887 for additional costs resulting from delays in completion of the contract and changes in the sequence of operations through no fault of the contractor.

In accordance with the provisions of its contract, the architect consultants received an additional fee of \$15,614 computed at 5-1/2 percent of the amount of the damages. We understand that the Architect is endeavoring to exclude from the fee computation certain other contract changes for which no services were rendered by the architect consultants.

According to the record the Architect, in recommending approval of the HHLL contract by the Commission, justified the rate of compensation on the ground that it was in line with the minimum rates approved by the Washington-Metropolitan Chapter of the American Institute of Architects.

The fact that no estimate of cost had been made at the time that the Architect negotiated the contract with HHLL would not have precluded efforts to negotiate a rate more nearly in line with the rates prescribed by GSA, to be applied either to an estimate that

would subsequently be developed by HHLL or to the contract award amounts, with the provision that fees on contract changes would be negotiated on the basis of the estimated value of architectural services involved in each change. It is to be noted in this regard that the rate of 5-1/2 percent specified in the contract was to be applied to actual costs which, at the time the contract was negotiated, were as unknown as the estimated cost and that the final estimates of HHLL (\$74.1 million) were approximately \$8.4 million more than the contract award amounts.

Comments by the Architect of the Capitol

The essence of the Architect's comments on this matter are presented below.

1. Long experience of the Architect has indicated that congressional committees or commissions overseeing various projects are interested in obtaining the best architectural-engineering talent available and in paying a fair fee for services rendered; thus the Architect and such committees and commissions have generally accepted the guidelines of the American Institute of Architects in establishing fees.

2. The Architect expressed doubt that adequate data covering the history of the project and the varied complications, conditions, and considerations affecting the project were presented by us to GSA, and he listed a number of factors as to which he questioned whether GSA was made aware.

3. The Architect cited the payment arrangements under its contract as being more realistic and conservative than similar arrangements under GSA contracts. Under the Architect's contract, 70 percent of the total fee is paid for services required up to the time of letting the construction contract and 30 percent is paid

for services required during the period of construction, whereas GSA pays 92 percent and 8 percent, respectively, for these services.

4. The Architect stressed that the design of buildings constructed on Capitol Hill differed considerably from the design of those constructed by GSA in more recent years and that the more intricate design of the Capitol Hill buildings resulted in more costly architect-engineering fees.

Our analysis of the above comments was supplemented by a review of these comments by GSA at our request. This analysis is summarized below in the order in which the comments were presented above.

1. The allowance of a proper fee giving a fair profit is not unique to the Architect; it is a basic objective in contracting by all Federal agencies. The question is what are a proper fee and a fair profit. GSA contracts with top-prestige firms on a repetitive basis and it is logical to assume that, if the firms were not receiving what they considered fair fees, they would not look for repeated contracts.

2. The factors listed by the Architect were reviewed by GSA, and its report to us thereon did not contain any significant information which had not been previously considered in our report.

3. There appears to be no uniformity among Federal agencies regarding the percentages of architect-engineering fee allowed for prior contract and postcontract award services, and a random check of contracts of several agencies indicated that the percentages for postcontract award services ranged from 5 to 25 percent. GSA advised us that its allowance of 8 percent for postcontract award services is the result of a studied analysis and that the allowance may be low by 1 to 2 percent. The American Institute of Architects

recommends 80 percent and 20 percent for prior contract and post-contract award services. We were advised by GSA that the 70 percent and 30 percent arrangement under the Architect's contract pre-dates World War II and that the trend since that time has been in the direction of lower percentages for postcontract award services. The 70-30 arrangement admittedly was advantageous to the Government, but in our view it was not of such advantage as to compensate for the difference in fees as discussed herein.

4. As stated on page 77, an additional one-half percent was allowed in the GSA rate for the complexity and extensive detail involved in designing the Rayburn Building. Moreover, complex design generally is reflected in higher construction costs which in turn increase the architect-engineering fee apart from an increase in the rate, in those cases where the fee is based on a percentage of construction costs. In the case of the Rayburn Building, this effect is particularly apparent because of the extensive use of marble, granite, and other high-priced materials which of themselves did not proportionately augment or intensify the architect's services over what they would have been if less of these materials had been used.

Comments by architect consultants

The architect consultants (HHLL) in its comments on this section of the report listed certain differences in scope of services between its contract and the usual GSA contract and questioned whether these differences were brought to our attention by officials of GSA.

These claimed differences were substantially the same as those suggested in the comments of the Architect of the Capitol (see pp. 126 and 127) to which we responded in our analysis of the Architect's comments (see pp. 160 and 161).

As stated on the preceding pages of this section, GSA estimated the cost of differences in services under the HHLL contract and a GSA contract on the basis of a comparison of the services required in each contract and the fee calculated under the GSA criteria was increased by \$243,000 for the estimated cost of additional services under the HHLL contract.

Architect fees--landscaping

The lump-sum contract for landscape architectural services does not appear to have been the appropriate type of contract in the circumstances existing at the time and may have been more costly than was necessary. Negotiations initiated by the Architect resulted in a reduction of the fee from \$178,000 to \$150,000. The situation is complicated by the lack of substantive documentation on the negotiations of the contract.

Pursuant to a directive from the House Office Building Commission, the Architect of the Capitol, on July 23, 1958, entered into a contract with Messrs. Robert Wheelwright, Markley Stevenson, and Joe W. Langran, landscape architects of Philadelphia, Pennsylvania, to furnish landscape architectural and engineering services necessary for the redesign and landscape development of the squares on which the Rayburn Building is situated and several other squares in the immediate vicinity of the Rayburn Building. The contract provided for a fee of \$178,000, of which \$115,500 was apportioned by the Architect to the Rayburn Building squares. Payment of \$112,500 had been made on this contract which had not been completed at June 30, 1965.

We found no meaningful information in the records of the Architect as to the basis on which the contract fee was determined or as to any other aspects of the contract negotiation. In July 1965 we were advised that the Architect had agreed to the flat fee of \$178,000 as reasonable and just, for the following principal reasons.

1. The Architect respected the integrity and professional excellence of Mr. Stevenson and his partners and their ability to estimate an appropriate fee. This respect was based

on the Architect's pre-Government experience with the firm on private work. The fee was based on the best judgment of the Architect and Mr. Stevenson at that time.

2. The scope of the planning work was uncertain, for both the preliminary and the final planning.
3. No cost estimates were available, nor could any meaningful estimates be developed until the preliminary work was completed.
4. An understanding was reached that professional services of the landscape architects would also be made available, without additional charge, as advisors to the Architect and critics with respect to other phases of the work, such as the fountains, walks, terraces, and walls, affecting the landscape treatment, but designed by other consultant architects and reflected in the construction cost rather than in the landscaping cost.
5. Cost of the landscape architects' travel, subsistence, and other out-of-pocket expense was included in the flat fee.

We believe that the above reasons do not afford adequate criteria by which any amount could be fixed or evaluated. In view of the apparent unknown factors at the time of the negotiations, it appears that a cost-plus-a-fixed-fee type of contract would have been more practicable.

In the absence of information as to how the fee was arrived at, we utilized information which apparently was not in the record at the time of the initial negotiations.

The following table shows the preliminary estimates of the cost of landscaping, exclusive of landscape architectural services, submitted by the consultants in April 1959, and partially revised in February 1962, and the related fee for landscape architectural services.

	<u>Total</u>	<u>Rayburn Building</u>	<u>Other squares</u>
Estimate of cost of landscaping	\$964,879	\$417,615	\$547,264
Landscape architectural fee	178,000	115,500	62,500
Percentage of fee to estimated cost	18.4	27.7	11.4

The disproportionate amount of the total landscape architectural fee charged to the Rayburn Building was because the architectural services for that building covered many small areas in and around the courts of the building, whereas the services for the other squares covered relatively open spaces.

The scale of rates listed below was furnished to the Architect by the American Society of Landscape Architects, as being representative rates.

<u>Cost of landscaping</u>	<u>Landscaping fee percentage</u>
\$ 2,000	16
20,000	11-12
100,000	8- 9
1,000,000	6- 6.5

On the basis of these recommended rates, the fee would amount to \$86,839 (9 percent of \$964,879), or \$91,161 less than the contract fee. In view of our comments on page 76, comparison of the contract fee with a fee based on the percentage of cost method does not mean that the fee computed by this method would be reasonable.

In our discussions of this subject with Architect representatives, they indicated to us that the fee appeared excessive in relation to the estimated costs of the landscaping work. They advised us in October 1965 that negotiations with the consultants had resulted in agreement to reduce the fee from \$178,000 to \$150,000.

The reduced amount is still considerably more than the fee based on the representative rates furnished by the American Society of Landscape Architects, as shown on the preceding page.

Comments by the Architect of the Capitol

The Architect informed us that in his opinion the flat fee, as adjusted to \$150,000, was reasonable. He explained that the adjustment resulted from work deleted from the contract and a scaling down of the flat fee as applied to landscaping of the Rayburn Building and that, in this renegotiation, consideration was given to (1) the fact that the landscape architects were required to prepare two sets of preliminary plans for squares 637 and 691, one for development of these sites as parks and one for use of the same squares for underground garages with landscaped surfaces because of a change in planning directed by the House Office Building Commission, and (2) the understanding with the landscape architects as to advisory services as described in item 4 on page 85.

Comments by landscape architects

The comments of the landscape architects laid heavy emphasis on extensive consultative services and collaboration and cooperation with other architect consultants engaged on the Rayburn Building and nearby areas. The landscape architects stated that principally because of these services the fee could not be measured as a percentage of planting costs and that the schedule of fees of the American Society of Landscape Architects provides for adjustment due to conditions inherent in a particular scope of work.

The landscape architects claimed that the supplemental agreement simply eliminated a portion of the remaining contract work relating to squares no longer to be developed and made some further concession representing to it the practical alternative to an

expensive and time-consuming lawsuit to enforce its contract right to payment of money badly needed and long since earned and invoiced for work accepted and approved, rather than giving any indication that the contract price was unjustified.

Because of the lack of documentation as to the extent of the various kinds of services rendered under the contract, we are not in a position to estimate the value of these services in relation to the total amount of the contract.

Conclusion

In our opinion, adequate documentation of contract negotiations is essential to orderly administration. As is evident in the instant situation, the lack of meaningful documentation made it impossible to ascertain the basis on which the fee was determined and other understandings that may have been reached in the negotiations. We believe that proper procedures effectively implemented would ensure that a clear and complete written record is made of all contract negotiations including significant factors that bear on the nature and scope of the contract work and specifically the considerations on which the contractor's compensation has been determined.

CONFORMANCE WITH PLANS AND SPECIFICATIONS

Records of the Architect on inspections of construction work and on sampling and testing of materials indicate that in some instances certain construction work did not meet the standards specified in the superstructure contract. These were individual instances, and our discussion of them is not intended to imply that they were representative of the general quality of the construction work. However, these instances related to ordinary and regular construction work for which clear and precise standards had been established on the basis of considered engineering judgment. Because of the technical nature of these instances, we are not in a position to express an opinion as to their significance. We believe that the extensive effort involved in negotiating their disposition and the manner in which the Architect dealt with such instances are appropriate for reporting by our Office to the Congress.

The discussion of these instances hereinafter summarizes data taken from the records of the Architect. We did not make any direct physical observation or inspection of these instances since they occurred prior to the commencement of our examination.

Reinforced concrete wall

According to core test results, the concrete in one of the reinforced concrete walls in the garage levels was substantially below the minimum design strength.

Cement concrete is tested for compressive strength in terms of pounds per square inch (PSI). The Architect's contract specifications prescribe minimum compressive strength requirements which vary according to the purpose for which the concrete is to be used. The weighted proportions of cement concrete ingredients are so specified or approved by the Architect as to yield the minimum

acceptable PSI strength. The tests to determine the compressive strength of the material are performed on specimen sample cylinders of freshly poured concrete after the samples have cured for a specified period of time. The specifications provide also that, if any of the test cylinders fail to attain specified strength, further tests shall be made, at the discretion of the Architect, of the concrete in place to determine its fitness to remain in the structure.

On October 24, 1961, the Architect advised the contractor that a National Bureau of Standards (NBS) test report covering the compressive strength of three concrete cylinders taken from a shear wall, which is a reinforcing wall in the garage levels, showed that the cylinders did not develop the strength of 4,000 PSI required by the specifications. The report stated that strengths of 3,330, 3,570, and 3,320 PSI were obtained for the three cylinders. The contractor was requested to take concrete cores from the shear wall for testing by NBS.

By report dated November 22, 1961, NBS advised the Architect that the three cores had compressive strengths of 3,450, 4,030, and 3,180 PSI. Therefore, the average was 3,553 PSI compared with the average of 3,407 for the three cylinders.

On November 28, 1961, the Architect requested the comments of the architect consultants on the concrete in the shear wall since the cylinder and core test results indicated that the concrete strength was not equal to that specified in the contract. In a letter dated January 4, 1962, the architect consultants recommended that, in view of the high stresses in this wall, the wall be removed and rebuilt with concrete meeting the requirements of the specifications. Also, they noted the close agreement between cylinder strengths and core strengths shown by the test reports.

On January 12, 1962, the contractor was instructed to take three additional cores inasmuch as the earlier cores confirmed the low compressive strength shown by the cylinder tests. By report dated February 9, 1962, NBS advised the Architect that the three cores had compressive strengths of 3,510, 3,180, and 3,810 PSI, for an average of 3,500 PSI.

On February 19, 1962, the Architect informed the contractor that the latest core results had confirmed the earlier tests. The Architect stated, however, that, since a replacement wall would not provide bond (adhesion to reinforcing steel) equal to the deficient wall, the wall would not have to be removed unless other subsurface defects developed.

The record did not show why the concrete was below minimum strength; however, the Superintendent of Construction advised us that the failures were probably due to variations in the components of the concrete.

Concrete thicknesses

Some of the floor slabs in the garage levels were of greater thickness and others were of lesser thickness than those indicated by the revised contract plans and specifications. These plans and specifications had been revised to increase the slab thickness to provide additional space for the placement of reinforcing steel and electrical conduits.

Architect inspection personnel had observed that the thickness of the slabs in the second garage level did not conform to the contract specifications, and in 1961 a survey was made of the southwest quadrant of the second garage level to determine the slab thicknesses. The survey showed that about 27 percent of the floor slabs were lesser in thickness and about 70 percent were greater in thickness than the contract stipulated.

The architect consultants attributed the wide variations to the contractor's inaccurate construction of forms as well as its lack of proper leveling equipment. The consultants stated that the lesser thicknesses did not necessarily mean that the slabs were of inadequate strength, because the revision in plans and specifications had raised the thickness of the slabs above that required for structural purposes, but that the lesser thicknesses could be an indication of inadequate cover over the reinforcing steel, which might result in spalling or chipping if moisture reached the reinforcing bars, and that excessive slab thicknesses could produce greater loads on the floor beams than they were designed for.

In December 1963 the architect consultants, in a memorandum to the Architect referring to defective workmanship in the floor slabs of the second and third garage levels for the west half, stated that, since some of the defects went beyond mere questions of

appearance and could affect the safety of the structure, it was its opinion that correction of these defects was a matter of utmost importance.

The Superintendent of Construction agreed that the garage floors were of lesser or greater thickness than that specified in the revised plans but asserted that in no case was the slab depth less than indicated in the original structural design. He stated that, if there was sufficient depth to include the reinforcing steel and the conduits, the depth was adequate. The architect consultant's representative advised us in September 1965 that the opinion expressed in the December 1963 memorandum could not be changed because he had not made any inspections of the slabs after the date of the memorandum but that he accepted the judgment of the Superintendent that the slabs were acceptable.

Uniform coloring of concrete

The Architect considered that the garage levels were not completed to a uniform color as was contemplated by the specifications. A credit to the Government was negotiated with the contractor in lieu of having it correct this nonconformance.

The specifications for the superstructure contract provide that, immediately after removal of the forms, all concrete surfaces shall be inspected and any poor joints, voids, stone pockets, or other defective areas permitted by the Architect to be patched shall be patched at once before the concrete is thoroughly dry and that the Architect may require cleaning of exposed concrete surfaces if in his opinion the surfaces are not of uniform coloring.

In June 1964 the Architect's chief inspector stated that a letter to the contractor would be necessary because the garage levels of the west half were soon to be occupied and there remained considerable cleaning work to be done owing to the unsightly and splotchy appearance caused by the numerous patches. Architect personnel informed us that the lack of uniform coloring was caused by the failure to patch defects at once after removal of the forms and before the concrete was thoroughly dry and by the use of different brands of concrete, since each brand differed from the other brands in color.

In September 1964 the Architect wrote to the contractor noting that the concrete work in the west garage areas had been the subject of numerous conferences and considerable correspondence and that the contractor had been periodically reminded since October 1960 of the deficiencies in concrete work. The Architect stated that, after repeated insistence by his office, the contractor finally performed certain corrective work but did nothing to correct

the lack of uniform coloring of the surfaces. The Architect advised that cleaning of the surfaces was required but, because of the imminent occupancy of these garage areas, this work could not be performed and therefore a deduction of \$103,295 was proposed for deleting this work from the contract.

In September 1964 the contractor replied that concrete experts had rendered an opinion that no practical improvement would result from cleaning methods and that the appearance of the garage areas was such as could be reasonably expected from the use of exposed concrete. The contractor stated that the Architect's conclusion that the concrete surfaces were not uniform in color was unreasonable and arbitrary when considered on the basis of the concrete material used and the intended use of the garage areas themselves. The contractor stated that the proposed deduction was therefore totally unjustified and based on a demand for work in excess of the contract requirements.

On the basis of a review of the estimate of \$103,295, the Architect reduced the areas that would require cleaning to conform to the specifications and in May 1965 adjusted the estimate to \$28,448. Subsequent negotiations culminated in a compromise settlement of \$17,500.

Compaction of backfill

In certain areas backfill was not spread and compacted in accordance with the contract specifications. In one instance a serious question arose as to whether the backfill was adequately compacted to serve its intended purpose.

The contract specifications for the superstructure stipulated requirements for the type of material and the placement and compaction of backfill included in the contract. With certain exceptions, backfill material was to be placed in layers not exceeding 6 inches and each layer was to be compacted to a minimum density determined by a test for compaction and density of soil prescribed by the American Association of State Highway Officials (AASHO).

In several instances the contractor was informed by the Architect that the placement and compaction of backfill material was not being performed in accordance with the specifications. One location concerning which there was considerable correspondence related to the backfill around the chilled water tunnel along South Capitol Street. This tunnel encloses the chilled water pipes necessary for the air conditioning of the House Office Buildings.

Protection of the chilled water tunnel was covered in the foundation contract, the specifications for which required that the chilled water tunnel be protected at all times and be supported in a positive manner to ensure its continued safety and to maintain the services in this tunnel without interruption. During the course of the foundation contract, there was movement of the chilled water tunnel, and, in accordance with the terms of the contract, the contractor did certain bracing and shoring work.

After the superstructure contract was underway, the Architect requested the architect consultants to consider ways of supporting

the chilled water tunnel by other than the backfill method outlined in the contract specifications. The architect consultants considered other methods, including running the chilled water lines inside the Rayburn Building, but concluded that the support for the chilled water tunnel should remain as called for in the contract, and the Architect concurred in this conclusion.

During the placing of the backfill material, the contractor was informed that the backfill was not uniformly spread and compacted as required by the specifications. However, in March 1962 the contractor submitted two compaction results on tests made by an independent testing company for the contractor. These tests showed that the material had been compacted to 102.3 percent and 100 percent of maximum density determined by the AASHO test. An additional test submitted by the contractor in April 1962 disclosed that the backfill was compacted to 99.7 percent of maximum density or slightly less than the 100 percent required by the specifications.

After the backfill was placed, settling of the backfill and the chilled water tunnel was observed and the contractor was directed to support the chilled water tunnel in accordance with the contract specifications. In October 1963 the National Bureau of Standards took four compaction tests from two test pits excavated by the contractor. The test results disclosed that the backfill was compacted to 88.8, 97.4, 93.9, and 93.4 percent of maximum density--substantially less than the 100 percent required by the specifications. The Architect concluded that the settling of the chilled water tunnel resulted from failure to place and compact backfill material and to remove temporary excavation bracing in

accordance with the contract specifications. In December 1963 the contractor was directed to correct these failures.

In April 1964 the contractor denied that the settling occurred as a result of faulty or defective workmanship; however, the Architect reaffirmed his position that the workmanship was not satisfactory. Also in 1964, means of supporting the chilled water tunnel and solidifying the material under the tunnel were considered. Other consultants were employed to examine into the matter, but no decision was reached.

In July 1964 the Architect informed the contractor that it would be necessary to examine the density of the backfill beneath the chilled water tunnel and directed the contractor to furnish the facilities, labor, and material for the construction of two or more test pits for such purpose. A memorandum by the Superintendent of Construction in July 1964 noted that a contractor official had stated that the contractor did not want to waste \$10,000 excavating additional pits because in previous excavations it had been found that the backfill did not have the required compaction.

Subsequently, the Architect and the contractor agreed that, in lieu of excavating test pits, the contractor would drill holes in the bottom of the slab of the tunnel in order to fill any voids or correct any settling in a manner which would ensure proper support of the tunnel. The Superintendent of Construction in June 1965 advised us that the holes would be capped in a way which would make them accessible for periodic inspections to determine any possible future settling. A similar situation arose with regard to the backfill under the slab adjacent to the subway terminal, and in this instance the contractor agreed also to drill holes through the slab and to fill any possible voids at no cost to the Government.

Gypsum block walls

Gypsum blocks in the subbasement did not have square edges and were not free from cracks and other imperfections as prescribed by the specifications.

The superstructure contract specifications required that gypsum partition blocks be solid block 30 inches by 12 inches by 4 inches and conform to the Standard Specifications for Gypsum Partition Tile or Block, C52-54, issued by the American Society for Testing Materials, which provide that gypsum block be rectangular in shape with straight and square edges and true surfaces and be free from cracks and other imperfections that would render them unfit for use.

Several times the Architect informed the contractor that numerous broken and defective gypsum blocks were being placed in the subbasement. In August 1963 the Architect stated that a majority of the gypsum blocks used in the partitions on certain corridors of the subbasement were broken and that payments for gypsum block would be withheld until such time as this work was removed and replaced to the satisfaction of the Architect. On September 5, 1963, the Architect noted that the walls had not been removed and replaced as directed but had, in fact, been completed.

On September 6, 1963, the contractor replied that gypsum blocks are never used as a load-bearing partition but instead serve as a base for applying plaster and as a means of increasing the fire-resistant properties of a partition. The contractor stated that cracks in the blocks would be harmful if they were not filled with mortar since the fire-resistant qualities would be partially destroyed and the strength decreased and that, where broken blocks were used, a mortar joint had been placed between the blocks so

as to render them as strong or stronger than those laid in one piece. The contractor concluded that the walls were sound, had not decreased the fire-resistant rating, and were suitable for plaster and that the intent of the specifications had not been violated.

An Architect engineer stated in a memorandum in November 1963 that in the cited corridors there were very few gypsum blocks with square corners, that some of the blocks were broken in 3 to 5 pieces and had diagonal cracks, and that the broken pieces of the blocks were coated with mortar. The walls were discussed with the head of the Structural Engineering Section, National Bureau of Standards, who expressed the opinion that walls constructed of irregularly shaped units were not as strong structurally as walls constructed of square-sided units and that the walls did not have a fire rating equal to those with fewer joints using whole units. He concurred in the recommendation that the walls remain rejected.

On December 13, 1963, however, the Architect advised the contractor that, in spite of deficiencies including the failure to install blocks with square edges and free from cracks as required by the contract specifications, the walls in question were structurally sound for the use intended and were adequately fire resistant. He concluded, therefore, that there had been substantial compliance with the contract requirements and payment would not be withheld. The Architect stated further that this action was not to be construed as a waiver of any contract requirements or as a precedent for any future deviation from the contract provisions and that, in general, strict compliance with the contract specifications was desired and defects and deficiencies would not be waived.

In June 1965 the Superintendent of Construction advised us that the issue had arisen from a well intended but overly critical

inspection by an Architect engineer who was not an expert in this field of construction. The Superintendent stated that before accepting the gypsum block he and the masonry inspector had made a careful inspection of the subject walls which disclosed that, although some of the blocks had broken edges and cracks, the wall was well erected and all joints were well mortared. Although acknowledging that the walls were not constructed in accordance with the specifications, the Superintendent said that the walls were considered to be as structurally sound as may be expected from this type of construction.

Comments by the Architect of the Capitol

The Architect stated that he considered that the provisions of the plans and specifications had been complied with by the contractor except in a few minor instances. For the most part, the Architect's comments on the instances cited in the preceding pages substantially repeated the content of our discussion thereon.

Regarding the reinforced concrete wall, the Architect stated that it was not physically possible to construct a replacement wall that would have the bond or structural strength of the as-built wall, that the strengths established by the tests were considered to be within the safety factor allowance in the structural design, and that, therefore, the decision had been made to accept the wall although tests showed that it was somewhat below the specified requirement at the time.

As to the concrete thicknesses of the floor slabs, the Architect commented that on the basis of tests there was no reason to believe that the thicknesses which were greater than that specified in the revised plans detracted from the strength of the slabs due to overloading.

The Architect has accepted our presentation of the facts on the compaction of backfill but has indicated that he cannot understand why this instance should be included in our report. We have advised him that we are reporting on this instance because of the extensive effort--more than 3 years--required to resolve the problem and because the solution which it became necessary to accept, apart from whether it was satisfactory, was not in conformance with the specifications.

Regarding the gypsum block walls, the Architect noted that these walls were in perfect order after having been erected for about 3 years.

Comments by superstructure contractor

The superstructure contractor stated that the matters discussed in this section of the report were addressed to management actions by the Architect and not to the action of the company as contractor and therefore were not appropriate for comment by the company. It expressed agreement, however, with our conclusion (see p. 105) that alleged incidents of nonconformance with specifications should be reviewed with the contractor as quickly as possible by a responsible official of the Architect's office.

Observations and conclusions

According to the Architect's office, the instances discussed in the preceding sections were not structurally significant; and, as already noted, we are not in a position to assess this judgment because of the technical nature of the instances. Nevertheless, the resolution of these instances required extensive time and effort by Architect personnel, which would not otherwise have been necessary and undoubtedly contributed to delays in construction. More striking about these instances, however, is that (1) they related to ordinary and regular construction operations rather than to unique, unusual, or complex operations and (2) the specifications involved in these instances were clear and precise and were accepted by the contractor as basic conditions of its bid.

It is further to be noted that specifications are the product of considered engineering judgment as to what is necessary to produce a desired facility and that many of these specifications are stated in terms of minimum requirements, from which it follows logically that the specifications are presumed to be practicable and, with proper construction supervision, substantially attainable.

Analysis of the incidents of nonconformance discussed above shows some apparent inconsistencies which could not be reconciled either by the record or by our inquiries of responsible officials. For example, the strong opinion expressed by the architect consultants on the importance of correcting defective workmanship in the floor slabs contrasts with the acceptance by the consultants of the Superintendent's judgment that the garage levels were structurally acceptable although no further work was done to remedy the reported defective workmanship.

With regard to the compaction of backfill, the wide disparity between the tests submitted by the contractor and those later taken by the National Bureau of Standards (NBS) may be attributable to the fact that the tests were made at different locations and therefore were not comparable. The decision of the Architect to accept the gypsum block walls as installed by the contractor was in direct conflict with the opinion of the head structural engineer of the NBS that the walls should be rejected, but the record does not indicate what consideration was given to the opinion of the NBS engineer.

One of the circumstances which often frustrates the proper correction of incidents of nonconformance is that frequently considerable time elapses between the detection of such incidents and the acknowledgment thereof by the contractor because correction is not aggressively pursued with the contractor. This lapse of time, by reason of the continuing progress of construction, creates a situation wherein the removal and replacement of the nonconforming work, as required by the specifications, poses serious problems of construction delays and of commensurate reasonableness in terms of the importance of the incident in relation to the cost burden on the contractor in the replacement.

As a consequence, practical considerations often dictate the acceptance of nonconforming work, either as is or with some improvised substitute, and in some cases the acceptance of a credit against the contract price. Some of the instances discussed hereinabove appear to fall at least partially in this category.

In considering how incidents of nonconformance with specifications may be properly corrected and possibly minimized in future

construction, we believe that the Architect should give particular attention to accelerating the negotiation of reported incidents of nonconformance with the contractor and to taking such positive action, particularly the assertion of contractual rights where warranted by the significance of any incidents, as will be calculated to bring these incidents to speedy and satisfactory resolution.

Comments by the Architect of the Capitol

The Architect did not comment directly on the above observations and conclusions. He stated that, in any large project such as the Rayburn Building, there are bound to be disputes between the contractor and the contracting agency involving compliance with the plans and specifications; that often these differences are genuine and fully justified and that both parties can bring strong support for their respective positions; and that it is the policy of the Architect's office to represent the United States in a prudent and reasonable manner and to obtain the best settlement possible without becoming arbitrary and disregarding the rights of the contractor.

SCOPE OF EXAMINATION

Our examination was directed to a selective review of (1) the costs incurred in the acquisition of real property and in the construction and equipping of the Rayburn House Office Building and the administrative and other costs related thereto and (2) the administrative actions of the House Office Building Commission and the Architect of the Capitol as those actions affected the aforementioned costs.

Our examination consisted principally of (1) a review of pertinent legislation, contracts and changes thereto, selected expenditure vouchers, correspondence, and other records including minutes of the meetings of the House Office Building Commission as they related to decisions of the Commission in respect to the subject construction, (2) discussions with representatives of the Architect of the Capitol, architect consultants, and contractors, and (3) physical inspections of the building at various times during the course of our examination.

Our review of contracts encompassed all prime contracts for architectural services, construction, and furniture and furnishings and all contract changes in excess of \$25,000, as well as some of lesser amounts, aggregating more than \$6.7 million of total contract changes approximating \$8 million to June 30, 1965.

Our examination was made principally at the field office of the Architect of the Capitol, located in the Rayburn Building.

APPENDIXES

RAYBURN HOUSE OFFICE BUILDING

COSTS INCURRED TO JUNE 30, 1965, AND ESTIMATED COSTS TO COMPLETION

Cost element	Costs incurred to June 30, 1965			Architect's estimated cost to completion
	Initial contracted cost	Contract changes	Total	
Acquisition of site (note a)	\$ 2,500,000	\$ -	\$ 2,500,000	\$ 2,500,000
Preparation of site:				
Relocation of Tiber Creek sewer	1,327,000	65,805	1,392,805	1,392,805
Other	367,449	-	367,449	297,415
Foundation (note b)	6,666,000	2,164,004	8,830,004	8,830,000
Structural steel	6,907,500	301,151	7,208,651	7,208,700
Superstructure and equipment (note c)	50,793,000	3,971,875	54,764,875	55,500,000
Furniture and furnishings:				
Procurement	2,740,914	132,640	2,873,554)	3,500,000
Consultant fees (note d)	148,582	7,295	155,877)	
Other items	464,851	-	464,851	460,605
Architectural and engineering services (notes d and e)	<u>3,613,142</u>	<u>359,240</u>	<u>3,972,382</u>	<u>4,000,000</u>
	<u>75,528,438</u>	<u>7,002,010</u>	<u>82,530,448</u>	<u>83,689,525</u>
Directly related work:				
Subway:				
Construction (notes c and f)	6,059,219	1,230,179	7,289,398)	7,909,700
Architectural and engineering services (notes d and g)	<u>442,728</u>	<u>139,804</u>	<u>582,532)</u>	
	<u>6,501,947</u>	<u>1,369,983</u>	<u>7,871,930</u>	<u>7,909,700</u>
Pedestrian tunnels:				
Construction (note h)	886,186	57,598	943,784)	1,045,985
Architectural and engineering services (note d)	<u>74,834</u>	<u>4,896</u>	<u>79,730)</u>	
	<u>\$ 961,020</u>	<u>\$ 62,494</u>	<u>1,023,514</u>	<u>1,045,985</u>
Administration costs			3,323,523	3,564,475
Reserve for completion of undeveloped space			-	<u>2,000,000</u>
Total			<u>\$94,749,415</u>	<u>\$98,209,685</u>

^aDoes not include \$171,000 for cost of square 636 acquired in 1930. (See p. 26.)

^bExclusive of claims totaling \$996,000 pending before a board of contract appeals. (See p. 27.)

^cExclusive of unsettled claims aggregating \$196,804 at June 30, 1965 (superstructure and equipment, \$141,456, and subway, \$55,348).

^dAmounts shown for contract changes represent fees on changes in basic contracts for construction and procurement of furniture and furnishings.

^eServices relate to relocation of Tiber Creek sewer, foundation, structural steel, and superstructure and equipment.

^fInitial contracted cost represents contract award of \$6,016,139 and miscellaneous items of \$43,080.

^gAmount shown for contract changes includes \$40,000 for additional fee on plans completed but not used because of major contract change. (See p. 62.)

^hInitial contracted cost represents contract award of \$880,400 and miscellaneous items of \$5,786.

RAYBURN HOUSE OFFICE BUILDING

CONTRACT CHANGES IN AMOUNT OF \$25,000 OR MORE (note a)

TO JUNE 30, 1965

Construction segment, related contractor, and description of change	Change order No.	Supplement	
		No.	Amount
PREPARATION OF SITE--TIBER CREEK SEWER RELOCATION (GUNNELL CONSTRUCTION CO., INC.):			
Changes in foundation piles and pile caps made necessary by subsurface obstructions encountered	11	1010, 1014 1015, 1017 1018, 1019 1021, 1025	\$ 44,778
FOUNDATION (McCLOSKEY & COMPANY):			
Requirement that contractor drive steel pipe piles instead of allowing it a choice between steel pipe piles and thin-shell piles	3	10	108,474
Changes in foundation pile caps made necessary by subsurface obstructions encountered	6	1	167,931
Changes in the foundations resulting from modifi- cation in the design of the garage floors. The changes included an increase in the thickness of the reinforced concrete mat and the addition of five reinforced concrete lugs or extensions	6	6	1,262,553
Primarily the addition of reinforcing steel in the foundation mat	6	9	27,214
Primarily the addition of certain permanent support below the subway terminal area	12	14	101,451
Installation of a drainage system to lower the sub- surface water level in the east half of the exca- vation	16	40	83,840
Settlement of claims by the contractor that prior supplements resulted in additional pile-driving costs	24	42	305,000
STRUCTURAL STEEL (BETHLEHEM STEEL COMPANY):			
Structural steel changes in the garage levels	3	3	-25,432
Damages for additional expenses incurred due to suspension of work granted from May 20 to Decem- ber 9, 1960, because of delays in the construc- tion of the foundation	5, 6, 11	13, 22, 25	126,313
3-1/2 percent interest on the contract amount re- tained by the Architect and on the value of fab- ricated material in storage or en route to Wash- ington at the time of the work suspension, May 20, 1960, from that date until termination of the suspension of work on December 9, 1960	10	26	44,494
Damages for additional expenses resulting from changes in sequence of work from that originally contemplated due to delays in the foundation work	20	33	113,080
SUPERSTRUCTURE AND EQUIPMENT (McCLOSKEY AND COMPANY):			
Substitute lead-coated copper through-wall flashing for zinc-copper or plain copper through-wall flashing	2	64	34,037
Change four freight elevators to combination passenger-freight elevators	4	42	51,501
Principally installation of additional flashing in certain areas and addition of a reference shelf to the steel files in members' suites	6	77	35,717

RAYBURN HOUSE OFFICE BUILDING

CONTRACT CHANGES IN AMOUNT OF \$25,000 OR MORE (note a)

TO JUNE 30, 1965 (continued)

Construction segment, related contractor, and description of change	Change order No.	Supplement	
		No.	Amount
SUPERSTRUCTURE AND EQUIPMENT (McCLOSKEY AND COMPANY) (continued):			
Provide lighting in the elevator shafts	12	131	\$ 28,159
Revisions to the elevator control and signaling system	12	172	37,124
Increase the thicknesses of the structural concrete floor slabs in certain areas of the second and third garage levels	50	50	120,661
Install water stops at construction joints in the garage areas	50	102	143,135
Install water stops at construction joints in the garage areas where temporary supports were removed	60	87	64,404
Relocation of certain reinforcing steel bars in beam encasements in certain areas of the second garage level	61	116	44,498
Subdivision and other changes in the House Office Building Superintendent's office area and in the post office facilities	64	1026	34,630
Modifications and additions to the legislative clock and legislative call system	108	1063	96,650
Widen the subway terminal, relocate the mechanical room, drive additional piles, and other related work to provide for the angle of approach of the subway from the Capitol, which was designed after the Rayburn Building was under construction	118	1089	83,924
Install a clock with audio and visual legislative call signals in each member's private office	120	1222	70,951
Operation and maintenance of mechanical and electrical equipment for sections of the building occupied by Government personnel prior to completion of the entire building	124, 127, 141, 146, 147, 150, 151, 155, 171	1338	398,969
Relocation of the first-aid department and the addition of women's health or gymnasium facilities	128	1141	144,676
Installation of cafeteria facilities	134	1088	880,000
Furnish and place topsoil with a lime stone formula and furnish and place a fiber-glass blanket in designated planting and lawn areas	140	1225	111,886
Tie the steam distribution system of the Rayburn Building into the existing steam distribution system of the Capitol Power Plant	142	1028	83,778
Installation of telephone outlets, electrical outlets, and buzzer and push-button signaling units in each of 160 members' suites. Similar work on the remaining nine suites was performed under supplement 1412 in the amount of \$5,155	148	1418	79,709
Relocation of a 20-inch sewer to avoid interference with the subway between the Rayburn Building and the Capitol	149	1126	51,031
Subdivision and other changes necessary to provide temporary facilities for Architect field office personnel in the basement	172	1195	48,728

RAYBURN HOUSE OFFICE BUILDING

CONTRACT CHANGES IN AMOUNT OF \$25,000 OR MORE (note a)

TO JUNE 30, 1965 (continued)

Construction segment, related contractor, and description of change	Change order No.	Supplement	
		No.	Amount
SUPERSTRUCTURE AND EQUIPMENT (McCLOSKEY AND COMPANY)			
(continued):			
Subdivision and other changes necessary to provide facilities for miscellaneous office and committee personnel transferred from the George Washington Inn	193	1266	\$ 88,804
Installation of a gymnasium annex containing swimming pool, locker rooms, shower rooms and related facilities including a passenger elevator and stairs to the main gymnasium	229	1216	490,000
Subdivision and other work necessary to provide office facilities for the House Office Building Superintendent. Facilities provided under supplement 1026 were reassigned to the Armed Services Committee	248	1429	35,206 ^b
Revisions to the men's gymnasium and auxiliary rooms including the addition of a soundproof quiet room	257	1265	32,476 ^b
Architectural, mechanical, and electrical revisions relating primarily to the subdivision of Army, Navy, Air Force, Veterans Administration, and Civil Service Commission liaison offices	261	1285	27,175 ^b
Provide a means of anchoring the marble stones in the pediment of the Independence Avenue portico	302	1286	37,261 ^b
FURNITURE AND FURNISHINGS--DESKS, TABLES, CASE GOODS (MAX BLAU CONTRACT FURNITURE, INC., AND MAX BLAU AND SONS, INC.):			
Additional quantities of desks, tables, bookcases, and cabinets principally pursuant to congressional requests	5	No number	44,344
FURNITURE AND FURNISHINGS--CHAIRS (MAX BLAU CONTRACT FURNITURE, INC., AND MAX BLAU AND SONS, INC.):			
Additional quantities of chairs principally pursuant to congressional requests	1	No number	55,200
SUBWAY--ALTERATIONS IN THE CAPITOL (BUCKLEY AND COMPANY, INC.):			
Principally for the use of a crane to handle spoils and materials via the access cofferdam constructed under supplement 25	30, 37, 39, 41, 46, 54, 57,	46	65,806
New sewers and connections and revisions to existing sewers in the east-west corridor area	23	18	28,227
Lowering the elevation of the underpinning, making provisions for two moving stairways, constructing an elevator shaft, modifying subway elevator lobby and adjacent stairs, and, constructing an access cofferdam	26	25	665,000
New sewers and connections and revisions to existing sewers in the terrace corridor area	28	24	28,263

RAYBURN HOUSE OFFICE BUILDING

CONTRACT CHANGES IN AMOUNT OF \$25,000 OR MORE (note a)

TO JUNE 30, 1965 (continued)

Construction segment, related contractor, and description of change	Change order No.	Supplement	
		No.	Amount
SUBWAY--ALTERATIONS IN THE CAPITOL (BUCKLEY AND COMPANY, INC.) (continued):			
Remodeling spaces in the Capitol to provide tempo- rary quarters for radio and television news cov- erage at the Capitol	45	40	\$ 30,085
Adjustment for the difference between the actual number of feet of piles driven and the estimated number of feet provided for in the original con- tract	63	100	-25,326
SUBWAY--SUBWAY AND TERMINALS (INTERCOUNTY CONSTRUCTION CORPORATION):			
Remove unstable soil and refill with concrete in the Capitol terminal area	7	17	34,186
Provide a temporary waler or support ring in the main cofferdam of the Capitol terminal, two addi- tional temporary raker supports, and an additional keyway or joint and water stop	9	21	28,023
SUBWAY--HOISTWAYS AND RELATED WORK IN THE CAPITOL BUILD- ING (GRUNLEY-WALSH CONSTRUCTION COMPANY, INC.):			
Changes in the mechanical work in the Capitol Building	40, 49	45	<u>34,942</u>
Total--all changes (\$25,000 or more)			<u>\$6,703,536</u>

^aThe original contract amount is increased or decreased by means of change orders. However, a change order may consist of several individual changes which are called supplements by the Architect. This schedule describes the individual supplements.

^bChange order issued subsequent to June 30, 1965.

ARCHITECT OF THE CAPITOL
WASHINGTON, D.C.

December 2, 1966

Mr. George H. Staples
Associate Director
Civil Accounting and Auditing Division
U. S. General Accounting Office
Washington, D. C. 20548

Dear Mr. Staples:

There are enclosed, herewith, six copies
of our comments on the proposed report of the
Comptroller General relating to the Rayburn House
Office Building. If you require additional copies,
we will be pleased to make them available.

Sincerely yours,


J. George Stewart
Architect of the Capitol

COMMENTS OF THE ARCHITECT OF THE CAPITOL
ON THE PROPOSED
REPORT OF THE COMPTROLLER GENERAL OF THE UNITED STATES
RELATING TO THE
RAYBURN HOUSE OFFICE BUILDING

You selected for reporting to the President of the Senate and the Speaker of the House of Representatives, three primary items, as follows:

- (1) CONTRACT CHANGES
- (2) ARCHITECT-ENGINEER FEES
- (3) CONFORMANCE WITH PLANS AND SPECIFICATIONS

Our comments will be directed in the first part of this reply, generally and specifically, to these three main areas and in the second part to page-by-page or section-by-section answers where considered appropriate.

In general, we feel that your examination of the project has leaned too much toward attempting to impose or apply standard procedures which you use in auditing executive agencies of the Government. Your auditors apparently fail to comprehend fully the essential difference in constructing a building for the use of the House of Representatives, where the opinions or ideas of any one of the 435 Members could and sometimes do come into play, and a building for an Executive Agency where there is just one head who makes final important decisions. There is only one U. S. House of Representatives, one United States Senate and one Congress of the United States. Their members are elected by the people whom they represent. It is often stated, and wisely so, that the Congress lives in a "fishbowl". To a lesser extent, the Architect of the Capitol, an officer of the

GAO note: The page numbers cited by the Architect in these comments refer to the draft report submitted to him for review; the numbers shown in brackets refer to the corresponding pages of the final report.

Congress, also works in much the same open atmosphere. For this reason, a building for the Congress draws scrutiny, criticism, and press comment from all over the country; our "sidewalk superintendents" are nationwide; whereas, a building of similar magnitude for another agency of Government in downtown Washington normally goes almost unnoticed. Yet some of these quarters are far more elegant than any facilities constructed by this office for Members of Congress.

An auditor who fails to recognize these important differences and assumes the work for the Congress falls into a standardized procedure devised by and for some executive agency, tends to delude himself and will find very difficult the preparing and publishing of a fair and meaningful report. And the General Accounting Office, which by law is an agent of Congress and undoubtedly does a great deal of intimate, close and continuing work for Committees and Members, of all offices surely should have some considerable appreciation of the truth of the old adage that circumstances do alter cases.

CONTRACT CHANGES

We share your view that the nearer perfect and complete the plans and specifications, the less change orders required and the less burden on the contracting agency. What you describe, however, is an ideal situation which is seldom, if ever, attained on a large project such as the Rayburn building, regardless of whether the contracting agency is the Architect of the Capitol, another government agency, or a private contracting firm. Changes in such work

are inevitable. If that were not true, there would be no need for the articles on changes carried in the general provisions of all Government construction contracts.

With regard to the changes discussed in your report, recognition should be given to the passage of time, changes in the membership of the Congress and of the Commission, the opinions of the individual Members and the fact that they and the Architect exercised their best judgment at the time the decisions on these changes were made. They could not depend on hindsight which might come into play years later in an audit.

We will comment briefly now on some of the larger changes you list:

Cafeteria - \$880,000. Your complaint is that in May and June, 1955, the Commission approved inclusion of a cafeteria in the preliminary plans for the Rayburn Building, but subsequently, upon approval in February, 1956 of a cafeteria in the courtyard of the adjacent Longworth Building, the cafeteria was deleted from the plans of the Rayburn Building (but as noted later herein, space was roughed out or allowed).

In approving a cafeteria in the Rayburn Building in June, 1955 and disapproving it eight (8) months later, you must recognize a logical assumption by the Commission that the cafeteria in the Longworth Building would be sufficient for at least 10 or 15 years. The Commission had before it the knowledge that the old cafeteria in the Longworth Building with only a seating capacity of 164 had served the House for many years and that the new cafeteria in the Longworth Building would seat up to 600 persons at one time - a 266% increase

in seating capacity. No one should imply faulty judgment on the part of the Commission under such circumstances.

The cafeteria in the Longworth Building opened in February, 1959 and almost immediately began to be patronized to capacity. Several circumstances contributed to this condition; (1) more outsiders began to pour into the facility; (2) for the first time, school children and other large groups visiting the Congress were served; and (3) the character of the room, the quality of food and service attracted more patronage among the Members and employees of the House. None of these circumstances could have been predicted with any certainty in February, 1956 when the Commission ordered the cafeteria deleted from the Rayburn Building preliminary plans.

In July, 1959, six months after the Longworth Cafeteria opened, the Architect advised the Commission that the cafeteria was being used to its limit and recommended that the plans for the Rayburn Building include installation of waste and feeder lines in an area which could be converted to future use as a cafeteria. This recommendation was approved by the Commission. Almost three years later, in May, 1962, when the need for a further expansion of cafeteria facilities became abundantly clear, the Commission authorized a cafeteria in the Rayburn Building at a cost not to exceed \$922,000, a figure subsequently negotiated downward to \$880,000 by the Architect.

The authenticity of any price guide published commercially for guidance in the development of conventional structures is questionable until the unit figures quoted therein have been checked and factored for the specific job involved. The "Means" guide to which your report refers states this point clearly.

It would have been interesting if your auditors had made a study of the funds saved in the final cost of the cafeteria as a result of the recommendations by the Architect of the Capitol, approved by the Commission, that a space be reserved for a cafeteria in the Rayburn Building and the installation of waste and feeder lines under the general superstructure contract as advertised.

Documentation of Changes: Much is stated in your report about what you describe as the lack of complete documentation of changes and the reasonableness of the final prices agreed upon. We respectfully disagree with your assertions in this respect. All major changes were approved by the Commission in charge, either formally as demonstrated to you by your review of directives and other documents, or informally as conveyed to the Architect of

the Capitol. You must realize again that the Architect cannot prescribe a set of rules within which a Commission of Congress may operate. Direction from a Commission to the Architect, whether formal or informal, is equally effective as far as the Architect is concerned; and he is not in a position to determine the form of direction.

A point at issue is the lengthening of the subway tunnel at the Capitol, which you imply was ordered by the Architect without approval of the Commission. This is contrary to the facts. We will therefore review the reasons for this change and how it was authorized. During the latter part of the Chairmanship of the late Speaker Sam Rayburn, he became very much concerned about the high rate of deaths among Members of the House. He asked the Architect verbally to investigate the possibility of operating station wagons or buses as a shuttle service from the House Office Buildings to the Capitol during roll calls in the House Chamber of the Capitol so that it would not be necessary for Members with known serious physical conditions to rush over to the Chamber for such roll calls sometimes several times a day. He also suggested that we investigate the subway tunnel to see that the walking distances were as short as possible.

The records will show that during the years 1960 and 1961, twelve (12) Members of the House died, and of course, Speaker Rayburn was numbered among these, his death coming in November, 1961.

Shortly after the House was organized in 1962 and Membership in the Committees and Commissions was completed, the Architect discussed the lengthening of the tunnel with the Members of the Commission, making known the feeling

of the late Speaker on this matter. As a result, they concurred in the extension of the tunnel and the Architect issued the order accordingly in March, 1962. Documentation -- no, you will not find all of these details in formal documents, but this is a summary of what happened. You should have found in our office adequate documentation after the order was given.

Your representatives also make some generalizations about the inadequacy of documentation in determining the amount of change orders. If your position is that technical architectural, engineering and construction details and other minute items considered in the settlement of each change order must be documented in such a way that your auditors with no training in these fields can understand every phase in the negotiation, then we admit our records were not kept on that basis. If all documentation must be in such extreme detail that a layman can understand and judge the reasonableness of the details that go into each transaction and settlement, the advantages of having expert estimators and cost analysts experienced in the field of construction are largely lost and their time wasted. Converting of cost factors and other data used by expert estimators in this field to a basis readily understood by auditors without construction experience would involve needless paperwork by the contractor, the consultants, and the Architect's staff to an extent that would be disproportionate to all reasonable requirements. We would find ourselves stressing the preparation of an imposing record for audit purposes at great administrative cost, rather than concentrating on getting the job done and effecting fair and equitable settlements for each change concerned.

One of the most time-consuming and demanding workloads placed upon the staff of this office and our consultants as a result of your site audit, was the "schooling" of your auditors in technical architectural-engineering-construction matters so that they could to some extent check the work we had done. If, at least, one such auditor had an engineering background, we believe that the time and effort taken in the auditing process would have been greatly reduced and the results improved both from our viewpoint and yours. So, if your representatives persist in these generalized criticisms involving matters not in their field, we respectfully suggest you ought to consider adding engineer-auditors to your force. The desirability of such a course is further demonstrated by your constant utilization of the services of an agency in the Executive Branch in this audit, although the law vested the authority to audit this office in the Comptroller General.

These remarks should not be considered as challenging the capabilities of the auditors assigned to this project, but unfortunately none had a knowledge of the technical fields covered by the audit.

As far as checking of change proposals of contractors is concerned, these proposals were carefully checked, validated when in order, and returned to the contractor when not. The effectiveness of our checking is amply demonstrated by the fact that of the more than 1,450 change proposals, reviewed, analyzed and processed, the contractors' proposals were reduced by an average of 12.4% or a net deduction of \$975,000.

In auditing the change order files, we believe that you should recognize and make due allowances for (1) your audit coming many years after the work was accomplished and the cases settled; (2) documentation adequate for construction personnel on our staff would not necessarily be the same documentation your auditors would require; (3) and during the greater part of the work, our personnel had no reason to believe that they would have to prepare, preserve and produce the kind of documentation you apparently require for a site audit -- the project commencing in 1955 and your audit being authorized in August, 1964.

With respect to the changes in general, if you consider the superstructure contract award price of \$50,793,000 and the estimated final cost of \$55,500,000 - a difference of \$4,707,000, and deduct from this total the amount of the larger changes directed by the Commission, such as the cafeteria, gymnasium annex, women's health facilities, etc., a deduction of \$2,308,991, the remaining total of the changes is only \$2,398,009 or 4.72% above the award amount of the contract. Further, if the present estimated final cost of the superstructure, excluding unsettled claims, is used (\$55,115,000 in lieu of \$55,500,000), the increase for change orders is only 3.9%. These are certainly reasonable increases due to changes in such a building contract.

ARCHITECTS-ENGINEERING FEES

[75 to 83]

In pages 66 to 72 and elsewhere in your proposed report, there is lengthy discussion on architect-engineer fees paid on this project, a comparison being

attempted between methods employed by the Architect of the Capitol and that which would have been used, supposedly, by General Services Administration in 1955 had they been authorized to undertake the project.

The purpose of your comparison appears tenuous, because you conclude your argument with the statement, on page 71, as follows:

(See GAO note below.) "The above discussion is not intended to imply that the method followed by GSA necessarily results in a proper fee. A number of Federal agencies have prescribed policies which provide for the negotiation of architect-engineering compensation in a stated amount based on the estimated cost of the architect-engineering services or on a combination of this and other methods including the percentage of estimated construction cost. We are currently reviewing the practices of the principal agencies which use contract architect-engineering services to determine which method of computing the compensation for such services appears to be most appropriate."

Your use of the GSA method as a yardstick or guideline for comparative purposes heavily suggests that it, in your opinion, is the proper one and that the other method is not. Further, you have indicated clearly to us that your position is that you favor fixed-price contracts where the conditions make such contracts feasible and cost-plus-fixed-fee contracts where conditions do not permit the negotiation of a reasonable fixed price.

Although we have discussed architect-engineer contracts with the Comptroller General's staff for years, this is the first indication we have received of a policy by your office favoring fixed-fee A-E contracts such as used by GSA. At our meeting with you October 3, 1966, we asked when the GAO initiated the thinking which favored fixed-fee A-E contracts. You advised it

GAO note: This paragraph was revised in the report to indicate the completion of our review of the practices of the principal agencies using architect-engineering services and the report thereon which is being issued to state our conclusions on the most appropriate basis for negotiating compensation for such services.

occurred 5 or 6 years ago when you were reviewing the accounts of another agency. We reminded you then that you are, in effect, applying your thinking of 5 or 6 years ago retroactively to the date more than 11 years ago when the Rayburn Building A-E contract was let.

The Architect of the Capitol and the Congressional Commissions under which he works are, of course, interested in providing private-practicing architects-engineers "a proper fee" on work for the Congress. This means return of their costs plus a fair profit. Our free enterprise system is based on every business group making a fair profit. This is fundamental so we feel it unnecessary here to justify the fair profit motive.

Long experience of the Office of the Architect of the Capitol has indicated that Congressional Committees or Commissions overseeing the various projects are interested in obtaining the best architectural-engineering talent available and in paying a fair fee for services rendered -- not necessarily the cheapest fee; thus, the Architect and such Committees and Commissions have generally accepted the guidelines of the American Institute of Architects in establishing fees.

In this particular case, you agree that the rate of 5-1/2% recommended by the Architect of the Capitol "was in line with recommended minimum rates approved by the Washington-Metropolitan Chapter of the American Institute of Architects***". The word "minimum" should be underlined.

With respect to your consultation with General Services Administration on what they would have considered a proper fee, let the record show that in making this comparison and drawing your conclusions, your representatives went directly to "architect officials of GSA" and that no "architect official" of our staff was invited to participate in these discussions affecting the responsibilities and procedures of the Architect of the Capitol and the House Office Building Commission.

Accordingly, we have reason to doubt that adequate data, covering the history of the project and all the varied complications, conditions, and considerations affecting this project, was in fact presented or could have been presented by you to General Services Administration to make possible a more realistic appraisal of the circumstances and a more reasonable fee than the 4% you quote. For example, was General Services Administration made aware --

1. Of the intricate nature of this structure, its required classic design, its non-repetitive features, and the extensive detailing required by the architects-engineers?
2. That no preliminary plans had been made when the building was authorized and the contract with the architects-engineers was let, but that it was the desire of the Commission in charge that work begin without delay on certain phases?
3. That the project be accomplished through letting of several contracts, not just one contract for the over-all structure, resulting in much more work by the architects-engineers in developing of plans and specifications and in savings to the Government in time and costs?
4. That the project was to be carried on over a period of many years, with increases in architects-engineers overhead and general expenses?

5. That the architects-engineers as a part of their contract, were required to serve on a joint advisory board with architects-engineers for other facilities; that such board met monthly (generally), requiring extensive contribution of time and talent by Harbeson, Hough, Livingston and Larson over a period of 10 years (this duty and responsibility still is in effect today and will continue as long as the remodeling of House Office Building facilities is being carried on)?
6. That the architects-engineers as a part of their fee, were required to make all layout work (for which General Services Administration allows a separate fee)?
7. That the work would be accomplished under direction of a Congressional Commission which would make the more important decisions?

We are convinced that if all these matters and the complete history of the project had been presented to "architect officials of GSA" by an architect of this office, the rate of 4% you quote would certainly have been increased under General Services Administration's method. This position is fortified by two happenings within recent knowledge: (1) your office is making a study of architect-engineer fees by direction of Congress, primarily because the statutory limitation of 6% is considered too low by some activities; and (2) discussions with GSA relating to another building project under this office has elicited the advice that the fee would be over 4%, based on preliminary information presented to them by an architect of this office. This building, while an important addition to the Capitol Hill complex, is not for the use of the Congress, nor will it require the detailing necessitated in the Rayburn Building.

We believe therefore that the rate for the Rayburn Building, assuming eminent architects were to be retained, under the GSA formula would have been not less than 5% of estimated cost, if it were possible to roll back time 11 years and ask them their advice of a "proper fee".

[78]
Using the 5% rate and the table you show at the bottom of page 69, the total fee under the method you are suggesting would have amounted to \$3,941,168 or \$328,025 more than we are paying under the contract in question.

The point here is not just the fee rate paid, but how that percentage is applied in order to measure a proper fee for quality professional services. That leads to the question: Should an architect-engineering fee be based on an estimated cost made by a Government Agency, from which a lump sum price is derived, or should it be based on a percentage of actual construction cost determined on the time-honored system of open competitive bidding in a free market, as is our practice?

We consider the actual cost of work basis (work for which services are rendered) to be the superior method, for these reasons:

- [78]
- a. Most important, this method is a more precise means of measuring a proper fee (your own computation on page 69 shows a difference of \$8,429,872 between the estimated cost of \$74,123,372 and the actual award price of \$65,693,500).
 - b. This method is fair and reasonable to the Government and to the architects-engineers.
 - c. Its use results in far less "red tape", no needless paper work, and obviates an almost endless chain of further negotiations with the architects-engineers after the letting of the construction contract with respect to changes and changed conditions.

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- d. The method we employ is used almost exclusively in private industry throughout the United States. It is standard practice in the architectural-engineering profession and building business. Some architectural firms have never been retained on any other basis, we are advised.
- e. It is recommended by the American Institute of Architects, and other professional societies.

Incidentally, Harbeson, Hough, Livingston and Larson advise that of the four other important works they have designed in Washington, they received a fee of 6% on three of these jobs (including the Federal Reserve Board Building and the Folger-Shakespeare Library) and 5-1/2% on the other job -- all such contracts being awarded them by agencies other than the Architect of the Capitol!

There is another important difference in the methods of paying architect-engineering fees used by General Services Administration and this office which you do not mention. We understand that General Services Administration allows 92% of the total fee for preparation of plans and specifications and all other work required up to the time of letting of the construction contract and only 8% for checking of shop drawings and approving samples after the letting of the construction contract. The Architect, however, allows payment of only 70% of the total fee for all work required up to the time of letting of the construction contract and 30% for checking of shop drawings, approval of samples, certain supervision and other work required by the Architect of the Capitol after the letting of the construction contract.

It is easily seen that the Architect's method of prorating the fee is far more realistic and conservative. Since receiving your draft, we have discussed this point with several professional architects and they agree without exception that 92% of the fee for the first stage of the work was far more than could be justified and that 8% was entirely insufficient to cover the checking of shop drawings and approval of samples. They also agreed that under the General Services Administration formula, the best thing that could happen to an architect-engineering firm - from a purely monetary standpoint - would be for the job never to proceed beyond the stage of completion of plans and specifications!

It is noted that you have excluded from the fee comparison the fee on changes in construction work after the award of the construction contract because, you say, the method under General Services Administration's system and the method under the Architect's system "do not lend themselves to being comparable". And why is this true? The record should show that the fee payable under the Architect's method is readily obtainable. Simply multiply the 5-1/2% fee rate by the net cost of the changes for which services were rendered. But, since under the General Services Administration's method you advise that the fee on each construction change is a matter of negotiation, neither your office nor anyone else at this late date could very well determine an accurate figure under General Services Administration's method.

We must stress also the vast difference in the type of buildings on Capitol Hill and those constructed by General Services Administration in more

recent years. This difference is readily visualized simply by standing on the Capitol West Terrace and glancing from the Cannon, Longworth, and Rayburn Buildings down Independence Avenue. Our buildings must be of classic design, not the so-called modern, box-like structures with numerous repetitive windows, floors, and other "assembly-line" features.

Even the most recently enacted legislation for a new building on Capitol Hill -- that for the James Madison Memorial Library of Congress Building -- provides that "The design of such building***shall be in keeping with the prevailing architecture of Federal buildings on Capitol Hill."

What we are saying here is not intended as a criticism of General Services Administration or its buildings, but rather it is to stress that there is and must be a design difference between buildings in the Capitol complex and those for some other sections of the City. Design does affect the cost of architect-engineering fees. The more intricate and less monotonous the design, the more costly the architect-engineering services; the more repetitive and standardized the design, the less one expects to pay for design work. This is a basic principle that should be fully understood and considered when making a comparison of fees paid by the Architect of the Capitol and those paid by some other Government Agencies.

Frankly, your criticism of the contract with Harbeson, Hough, Livingston and Larson comes rather as a surprise. Before this contract was entered into by the Architect of the Capitol, the draft was taken to the Office of the

General Counsel of the General Accounting Office and it was reviewed by an official of that office with my representative. The other architect-engineer contracts for remodeling of the old House Office Buildings were handled in a like manner at the same time. The contract with Harbeson, Hough, Livingston and Larson was entered into in August, 1955, and the original contract was placed on file in your office. For the next nine years, your office audited payments under this contract, a total of 31 payment vouchers with detailed requisitions attached, and at no time can we recall any question being raised by your representatives either as to the terms of the contract or the payments thereunder.

You have indicated informally that our consultation with the staff of the Comptroller General in 1955 related only to the legal validity of the contracts. That is not our understanding of the relationship between the Comptroller General and the Architect of the Capitol. Both are agents of the Congress and it has been the longstanding policy of the Comptroller General to make available to the Architect of the Capitol advice on matters of legal sufficiency, policy, propriety, and other aspects of proposed actions. Very often the Architect has been directed by higher Congressional authority to seek such advice from the Comptroller before acting, and that advice has always been forthcoming in a very fine and cooperative spirit.

We realize that the type audit you now make of the operations of this office was authorized by the Congress in August, 1964, but that fact does not

erase the nature, scope, and effect of our consultation with the Comptroller General and his staff over the years.

[See GAO note.]

Finally, you mention that the architects-engineers were paid a fee on payment to the structural steel contractor for delays in completion of the contract and changes in sequence of operations through no fault of the

GAO note: Refers to material contained in draft report but omitted from final report.

contractor. Your records should show that we agreed to payment of this amount to the architects-engineers only after consultation with your office during which there was taken into consideration a pertinent court decision.

Landscape Architects Fee

In the case of the architects-engineers, your argument is directed toward the desirability of a fixed-fee contract; while for the Landscape Architects, where we negotiated a fixed-fee contract, your position is changed and you suggest that a contract on a cost-plus-a-fixed fee might have been more appropriate.

In the case of the architects-engineers, you frown on our practice of basing fees on the minimum rates recommended by the American Institute of Architects; however, for the Landscape Architects, you resort to use of rates recommended by the American Society of Landscape Architects for computing a possible fee.

These positions on the part of your representatives appear inconsistent and lead to the conclusion that they might be swayed to some extent by hindsight, rather than recognizing that every such action taken by a contracting officer includes the exercise of sound judgment based on the then known facts and circumstances and his best estimate of future developments.

The Architect of the Capitol feels that the flat-fee for the Landscape Architects is reasonable, as adjusted to \$150,000. The adjustment resulted from work deleted from the contract and a scaling down of the flat-fee as applied to the landscaping of the Rayburn Building. In this renegotiation,

we considered the fact that the Landscape Architects were required to prepare two sets of preliminary plans for Squares 637 and 691, one for development of these sites as parks and one for use of the same squares for underground garages with landscaped surfaces (again, a change in planning directed by the Commission and implemented by the Congress). Due consideration was also given to item 4 on page 73 of your report with respect to services rendered by the Landscape Architects as advisors to the Architect of the Capitol on other phases of the work not related to the estimated or actual cost of landscape work.

CONFORMANCE WITH PLANS AND SPECIFICATIONS

Notwithstanding your opinions questioning the conformance with the plans and specifications, we consider that the provisions of the plans and specifications were complied with by the contractor except in a few minor instances. In instances during the life of the contracts where we detected nonconformance, we have withheld payment for such work until conformance was obtained or satisfactory adjustments were made.

Reinforced Concrete Wall: When a condition such as you describe is encountered on a construction job of this nature, it is incumbent upon the Architect to reach a practical and proper solution, taking into account the effect on the progress of the work at that time and whether the apparent structural deficiency is within the safety factor allowed in the structural design.

In this particular case, since the slabs below and above the shear wall and the exterior abutting wall were in place, it was not physically possible to construct a replacement shear wall that would have had the bond or structural strengths of the as-built wall and, further, it was considered that the strengths established by the tests were within the safety factor allowance in the structural design. Therefore, the decision was made to accept the wall although tests showed that it was somewhat below the specified requirement at the time.

Concrete Thickness--Floor Slabs: The slab thickness has been increased by 1-1/2 inches to provide additional cover for the reinforcing steel and electrical conduits. The survey was made to check the adequacy of cover over the reinforced steel, tests of the slabs being made by use of a metal detector to determine the distance between the top of the finished slab and the conduit and reinforcing steel. While there was some slight variance in the thickness of the slab, in no case was there evidence of insufficient cover of concrete, nor was there any justification for a conclusion that the thicker slab detracted from its structural strength due to overloading. Further, at no place was the thickness less than the original design strength.

Uniform Coloring of Concrete: In the garage levels, this office was not satisfied with the lack of uniform color of the exposed concrete, due primarily to unsightly patching work by the contractor. As your report indicates, this was brought to the attention of the contractor over a period of time without a satisfactory solution being attained.

The contractor took the position that our demands for uniformity were unreasonable and went beyond that of the contract requirements.

The contractor and our office then agreed to bring in an expert from the American Concrete Society for his advice. The expert's opinion favored the contractor's position more than that of the Government. We then negotiated a settlement with the contractor resulting in a credit of \$17,500 to the Government.

Compaction of Backfill: Your summary of the details of this problem outlines the basic facts. We fail to understand why such an item should be included in this report. The work as originally performed was deficient; this office brought such deficiencies to the attention of the contractor and directed corrections; and the contractor made the corrections. There is nothing unusual about such a case.

Gypsum Block Walls: Your statement that these blocks on the sub-basement level showed cracks and other imperfections is correct to an extent. The wall was carefully inspected by our Superintendent of Construction and our Chief Masonry Inspector, who has had long experience in the industry, and it was their considered judgment that although some of the blocks had broken edges and cracks, the walls were well erected, with all joints and cracks well mortared, and were satisfactory for the purpose intended. Incidentally, these walls have now been erected for about three years and of this date are in perfect order.

PAGE-BY-PAGE COMMENT

[18]

Page 17: You state with respect to change orders:

"Because these changes implicitly carried the disadvantages noted above we believe that they probably added significantly to the cost of the Rayburn Building project."

It appears that you are attempting here to build a fact upon a generalized assumption, using such words as "implicitly," "probably," and "significantly." You offer no substantiating evidence, merely a shaded conclusion. What is "significant" in this instance? More precisely, what would constitute "insignificance" because you imply that something would. We believe these changes did not add "significantly" to the final cost.

[19]

Page 18: You state that some changes were of a nature which in your opinion should have been considered in the development and review of the plans and specifications. We do not claim that any set of plans and specifications for a project of this nature would be perfect, nor should perfection be expected.

Changes in a project of this magnitude are inescapable; otherwise there would be no necessity for the articles covering changes which are written into the standard provisions of every Government contract. As for the change you list on this page as the most significant, (lengthening of subway) we have already explained the circumstances surrounding this addition in our general comment on "changes".

[20-21]

Page 19: We have already commented on the question of documentation.

You outline three "findings". The first relates to the significant features being included in the original plans. We have no disagreement with this principle and have followed it for many years, but as indicated elsewhere, these matters may not always be determined finally by this office. Secondly, you speak of adequate documentation. We feel there is adequate documentation for the use of our skilled estimators but agree that it might not be adequate for complete analysis by an auditor without some experience or training in the construction field.

Thirdly, you indicate that the Architect should consider the practices of another Government agency and "other sectors of construction" that, in the absence of compelling circumstances, plans and specifications for all segments of construction should be finalized and integrated before any construction is started and that bids for construction should be solicited and awarded on the basis of single contractor direction and responsibility.

If time is not a factor, we would have no disagreement with this latter view. However, in this case, the Architect was ordered by higher authority to proceed with certain portions of the contract as expeditiously as possible, time being a factor. In this case, we feel that the proper sequence was followed and, under similar circumstances, would again recommend such a procedure, which saved both time and money. It may be easily seen, for example, that the overhead and profit of a general contractor was saved in the case of the structural steel contract covering both furnishing and installing same. This item alone amounts to almost \$700,000 in savings to the Government.

[22]
Page 20: Our comment on the Architect-Engineering fees are stated in the forepart of this report.

[23-24]
Page 20: Conformance with plans and specifications. The position of this office is that the provisions of the plans and specifications were complied with, except as to a few very minor items, otherwise neither we nor our architect-engineers would have approved payment for the work. There were several instances in this project where we did withhold payment for work until it was made to comply with the specifications or the matter was adjusted to our satisfaction.

In any large project of this nature, there are bound to be disputes between the contractor and the contracting agency involving compliance with the advertised plans and specifications. Often these differences are genuine and fully justified. Both parties can bring strong support for their respective positions. In such cases, it is our policy to represent the United States in a prudent and reasonable way and obtain the best settlement possible, without at the same time becoming arbitrary and disregarding the rights of the contractor.

We have commented earlier in this report on the five items which you question as possibly not being in compliance with the plans and specifications.

[25]
Page 22: The basis you outline for handling and pricing of supplements is stated correctly. This is the same procedure and rate structure for changes used generally by Government agencies. It is used in our office, however, as a guideline and in several significant cases we were able to reduce the general contractor's overhead and profit allowance below that stated in your report.

[33]
Page 29: Landscaping. You state that the \$197,900 figure used in our statement represented only a portion of the total landscaping costs. You point out that \$111,886 for top soil and fiber glass blanket was covered by a change order issued to the general contractor. It therefore is included in the total costs of the superstructure contract, rather than under the heading of landscaping. This is correct and we have listed an explanation of this change order in the published hearings before the House Committee on Appropriations. See page 146 of the hearings on the Legislative Branch Appropriations Bill for 1966.

[49-50]
Pages 44-45: Maintenance of building equipment by contractor. There were "compelling reasons" for moving these employees into the Rayburn Building with which your auditors are apparently not familiar, but which were well known to Members of the Commission and the Architect of the Capitol and his staff: (1) The George Washington Inn was an old, dilapidated building, an eyesore in the community and somewhat of a firetrap. Its use by House personnel was a constant source of concern to the Commission and the Architect. (2) It was desired that the garages be commenced as soon as possible in view of the serious lack of parking for Members and employees of the House.

[53-61]
Pages 47-53: Your representatives generally disagree with the "Architect's decision" to separate the total project into several phases. First, any such recommendation or decision by the Architect was in agreement with the wishes of the Commission; otherwise, it would not have been carried forward in that manner.

Second, we do not agree with your statement that such a division of the project is not followed commonly in most large construction. If you will consult with the larger contractors in this country, you will find a conclusion exactly opposite from that expressed by you. In our own work, just within the last several years, we let the excavating and foundation contract for the New Senate Office Building separately from the superstructure and experienced no great difficulty. Similarly, in prosecuting the extension of the East Central Front of the Capitol 1958-1961, we let the excavation and foundation contract separately from the superstructure and experienced no difficulty, in fact, even the major superstructure work was carried on under two different contracts because of demand for the use of the exterior of the new building for the 1961 Presidential Inauguration. Still we experienced no serious difficulties in coordinating the work of several contractors and thereby saving a great deal of time and money.

Further, within recent months the newspapers have carried accounts indicating that a contract will be let soon for the substructure of the new building for the Federal Bureau of Investigation and that the U. S. Mint in Philadelphia is being constructed in several phases rather than one package. Both are GSA jobs.

We believe in your considerations, you have overlooked or not given due consideration to the element of saving time. Time is still one of our most precious commodities. Throughout the commercial and industrial field, the saving in a year or more of time in a construction project's completion

often means more in savings to the owners than all the gain you feel that might occur if every single portion of the project is delayed until every single plan for the whole project is completed, reviewed thoroughly, and approved. Our experience and information are that the logical splitting of a large construction project into two or more phases, in order to promote over-all prosecution where time is of the essence, is a part of the American construction scene which is here to stay.

We agree, of course, where time for completion is of no consequence, the more leisurely path of holding all work in abeyance until all plans are completed and approved would be the obvious course to follow, especially on smaller jobs.

Based on building index cost increases alone, we estimate the method of proceeding with work in connection with the Rayburn Building saved the Government between \$1,400,000 and \$1,800,000. To these figures should be added about \$700,000 saved on the steel contract by not having this contract go through the general contractor.

The work covered by the largest change order on the foundations \$1,262,553, would still have cost money regardless of whether it was included in the original foundation contract as bid or as a change order. Only a small portion of this change order, if any, can be said to have been an additional cost; namely, that portion which resulted from the lack of competition on the item.

Whatever that item might or might not be falls into the realm of guess-estimating, but assuming there is ground for saying a portion of the charge was occasioned by the lack of competition on this item, that amount when added to the specific items you list on pages 51 and 52 are more than [57 and 58] offset by the savings outlined above and the fact that much time was saved in construction.

[62]
Page 53: The main item mentioned, lengthening of the tunnel, is explained heretofore in this report.

[63]
Page 54: You question certain changes for substitution of materials which, you indicate, could have been avoided if the Architect had accepted suggestions of the architect consultants or considered other information prior to award of the basic contracts:

Substitution of pipe piles for thin shell piles: The decision to permit thin shell piles under the foundation contract was made on the basis of results of test borings that showed no obstructions of significance. Under such circumstances, it was normal to consider that thin shell piles would be satisfactory.

The contract provided that the failure of piles in this category would be replaced at Government expense.

When thin shell piles began to fail at an excessive rate, economics and necessity to minimize work delays dictated a need for heavy pipe piles.

Since this change benefited both the Government and the contractor, the contractor agreed to share equally with the Government the cost of heavier piles. The architect consultants, after analysis, stated the additional charge by the contractor at 30¢ per foot as "a very good price".

Due to the very reasonable figure agreed to by the contractor, we believe that this work cost no more as a change order than it would have as a part of the original contract.

Substitution of lead-coated copper through-wall flashing for zinc-copper or plain copper flashing .. \$34,037: The complete story of this change is fully documented in the files of this office. Before the opening of the bids, indications were that several Government agencies had found the zinc-copper alloy suitable for certain flashing work required in the building, and the specifications accordingly permitted its use on an optional basis. However, further investigation over a period of several months caused a doubt to be raised among architect-engineers and the Architect's representatives relative to the use of this product. It was found that while some other Government agencies permitted its use, problems had arisen and certain agencies were changing their standard specifications so as not to permit zinc-copper alloy flashing for through-wall purposes.

Under these circumstances, after completion of our investigation, the contractor was directed to substitute lead-coated copper as a change under the contract.

The \$34,037 expended does not represent a true additional cost, but is substantially the same cost that should have been included in the bid price if the original specifications had not been revised to permit the option.

[64]
Page 55: Changes which you feel should have been foreseen by the Architect-Engineers or the Architect:

(1) Increase in thickness of concrete floor slab to facilitate the placing of conduits without conflict with reinforcing steel: Initial difficulties with respect to this item were noted in review of the plans by the Architect's personnel in 1959 and were corrected prior to bidding the job.

Several months after the contract was let and the work begun, further difficulties came to light with respect to placing of conduit and reinforcing steel in the floor slab. Such placing in the space allowance in the beam areas would have required precision work beyond the normal skill of the trades and would have resulted in numerous bends in the conduit in excess of code allowance. Such an installation would also have made maintenance work, with respect to replacing of wires, extremely difficult.

It appears that this condition, which had to be corrected, was due to lack of coordination between the architect-engineer's structural and electrical consultants.

(2) Lowering of water level in east half of the construction by use of well point system.

Ambiguity of specifications might have contributed to the Government paying for this work, but not to the issuance of the change order for the work. The work would have been directed by the Architect of the Capitol regardless of who had to pay the bill for the simple reason that the well-points were found necessary.

(3) Furnishing of top soil by general contractor.

It was planned that this should be a separate contract, let pursuant to specifications prepared by the Landscape Architects as a part of the landscape work. When the time came to install the top soil, discussions with the general contractor led to the conclusion that in the interest of economy and coordination of the work on the project, a change order to the general contractor was in order. Inasmuch as you constantly stress your view that all work should be under a general contractor, it is difficult to understand your objection to this transaction. There is no showing that the amount agreed to is excessive.

(4) Lighting in elevator shafts as a safety precaution.

As you indicate, it is our standard practice, in the interest of safety, to install lighting in all elevator shafts and to paint these shafts a light color. We readily admit lack of the requirement for lighting of the shafts in the original contract was due to oversight in reviewing of the specifications and plans by this office.

(5) Anchoring of stones in pediment.

Again, this was an error by the architect-engineers, due to lack of provision for adequate anchoring of the kneeler stones; an error not detected in this office in reviewing the marble details.

[67 to 72]
Pages 57-60a: Documentation relating to contract changes. In this listing, you have included several changes which, by their nature, involved careful and extensive negotiations with the contractor before reaching a final agreement acceptable to both parties.